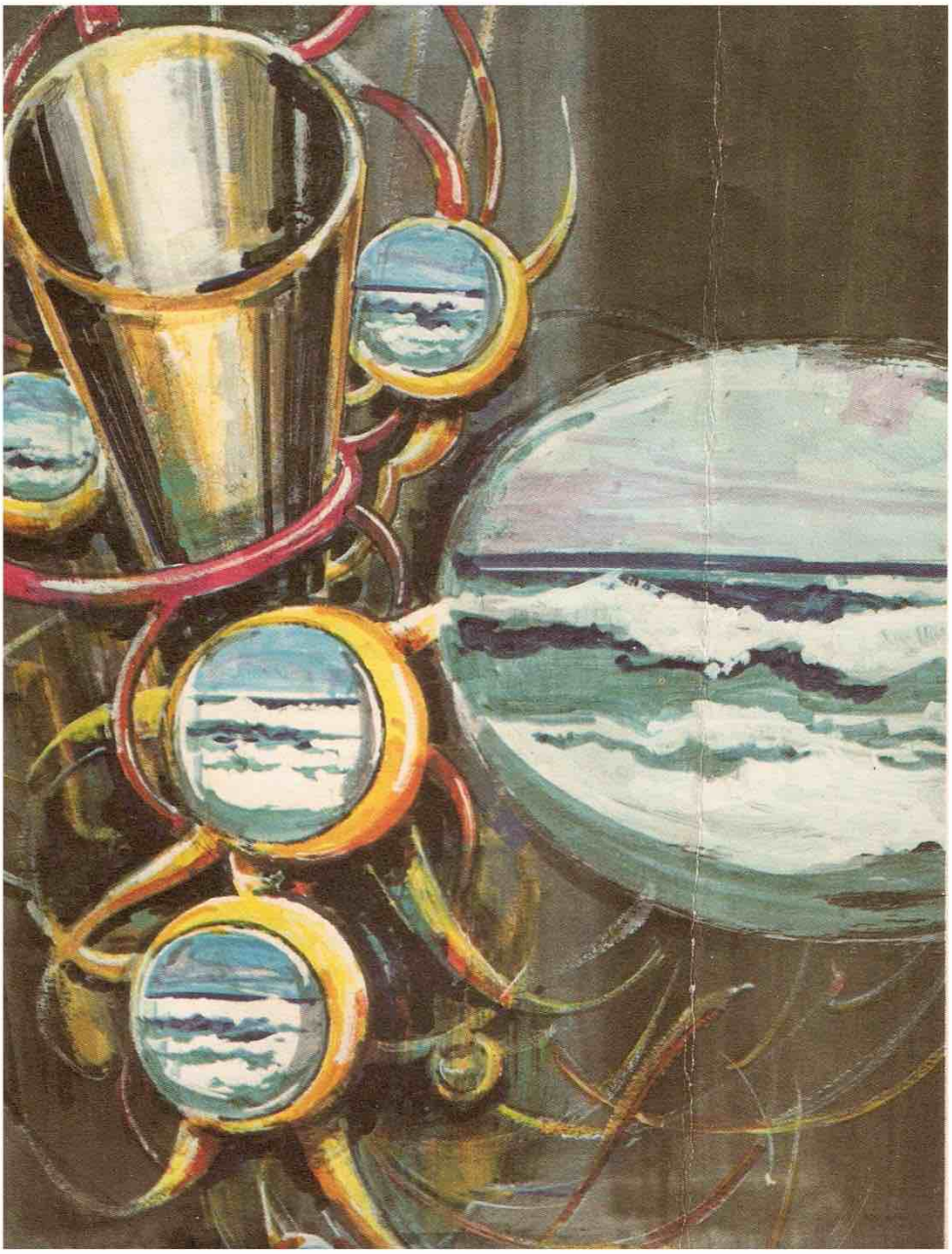

Segmental Neuropathy

The First Evidence of Developing Pathology

Segmental Neuropathy

The First Evidence of Developing Pathology

Second edition 1965/2014

Preface to the web second edition

It has been almost half a century since the initial publication of Segmental Neuropathy. The concepts presented were, and still are, among the most advanced expositions of chiropractic theory. The initial print run of 2,000 copies was exhausted long ago. Hence, this republication. The original text featured a spiral binding to allow expansion with material gleaned from further research. Alas, with the fading away of the Synchro-Therme project, the text was never expanded and has been long out of print. This second edition fulfills at least part of that promise: we have added eight appendices. The Appendices are comprised of interviews, correspondence and essays by the principle authors of the text, as well as one obscure piece of Japanese research that helped inspire the project. While technological advances in thermography have rendered the Synchro-Therme obsolete, the underlying science remains valid and can be applied with modern instrumentation. It is hoped that this second edition will inspire a new generation to further develop the science of chiropractic.

Stevan Walton, D.C., FICC

Lahaina, Maui 2013

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Dedication

The greatness of Chiropractic lies within its principles. The ignominy of Chiropractic lies in ignoring those principles, and accepting less effective substitutes. This book is an attempt to restore dignity and honor to the man whose brilliance as a thinker and writer has been overshadowed for too long. This effort therefore is dedicated to:

D.D. Palmer

With the hope it will quicken the hearts of those who have grown faint in the pursuit of the truth of Chiropractic.

Acknowledgments

While this book is published under the auspices of the Canadian Memorial Chiropractic College, and no author is listed, credit must be given A.R. Petersen, D.C, who contributed the bulk of the material. His early laborious work of reading manuscripts on neuro-dynamics and vascular physiology, his diligence in organizing the material, his ultimate discovery of the spinal neuropathy, and his vision of scientific practice for the profession, merits the approval of the entire Chiropractic profession.

Other contributors are:

John Dickins, D.C., for early writings.

Mr. Bruce Vaughn, student of Chiropractic, for early drawings.

Mr. Frank Pierce, engineering.

Harry H. Andrews, M.D., consultant.

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R. J. Watkins, D.C., certain sections on the nervous system.

Herbert M. Himes, D.C., philosophical interpretation of the scientific concept.

There are other contributors, too numerous to mention, who read, corrected, made suggestions, and in other ways made this effort possible. To all of the above, we of CMCC offer our thanks.

1965

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The Science of Chiropractic

"The science of Chiropractic has modified our views concerning life, death, health and disease. We no longer believe that disease is an entity, something foreign to the body, which may enter from without, and with which we have to grasp, struggle, fight and conquer, or submit and succumb to its ravages. Disease is a disturbed condition, not a thing of enmity. Disease is an abnormal performance of certain functions; the abnormal activity has its causes, as much so, as the windows which are bound and cease to be moveable, or the transoms and doors which are unable to close, because of the settling of some portion of the building. The morphological alterations of the body superinduced by displaced structure can be located and as surely corrected as can the sagging of the building. Disease is manifested by functional aberrations and structural alterations. These constitute the signs, symptoms and lesions of a departure from a state of health. Disease does not involve any new functional expression which the body does not already possess; it is only a change in the amount of energy and function performed. The body in disease does not develop any new form of energy; what it already possesses is diminished or increased, perverted or abolished. In health there is a constant physiological, invincible molecular change –the manifestations of energy. In disease this manifestation of energy is modified and the quality of structure is altered. The transmission of physiological impulses in normal amount is health; in a less or greater degree, disease. Physiological metabolism is health; pathologic metabolism is disease."

With this view, it can be stated that optimum health may be compared to a delicately poised high-wire artist who maintains his balance by incessant identification and compensation for minute changes in his position. In contrast to this comparison, the spinning top, stable in its own inertia, slowly wobbles to a stop if more speed is not injected periodically.

Every puff of breeze, every twitch of wire, every thousandth of a step disturbs the status quo and demands immediate response by the performer. This response must be instantaneously and perfectly judged, otherwise swaying, which is inevitable, becomes uncontrollable – then he topples. Thus it is in your body: every system, every organ, every fiber, every cell is in a state of constant flux, adapting to the changing stress of environment. This activity, exhibiting intelligence*, does not ebb passively to and fro like seaweed in the tide. All indicating mechanisms must constantly be engaged in identifying the full range of all actions.

*The term intelligence is used in this manuscript not in the sense of the intelligence of the cerebral cortex of man, but rather in the context of the cellular, biological intelligence that distinguishes

living from non-living things. It implies the capacity to choose the correctly graded responses necessary to adapt to constantly fluctuating levels and complexly interwoven patterns of changing circumstances.

Health requires integration of a multitude of functions developed and performed correctly, not only individually, but more importantly in terms of the sum total of all activities required by the body. Dependable balance or biological control requires an intricate system of communication for intelligent integration. The activity of each separate part must be inter-related with every other part. Each action and reaction must be modified according to an intelligent "pattern" or "design" as the highest attainable expression of life. These intelligent behavior patterns are held in the memory core of the nervous system for the entire spectrum of functional balance. This is true for the most complicated as well as the most fundamental acts which the organism may need to perform. Such a storehouse of information provides for an intelligent response which is inherently competent to maintain not only self-preservation, but improvement. The nervous system monitors not only extrinsic functions, but controls inherent function, protecting itself from imbalance with a precision no man-made electronic computer is ever likely to approach.

The eye, for example, is a self-contained photo-lab which processes motion pictures of the finest clarity, developing them in milliseconds. It is so unbelievably sensitive that it will respond to a single quantum of energy – the theoretical smallest particle into which energy can be subdivided. In everyday terms this means the ability to see a candle flickering at a distance of five miles in perfect darkness. Yet, this same eye can discriminate between grains of sand in the Sahara desert at noon.

To confound the imagination further – even as the eye is alerting the brain to approaching objects, some of which imply danger, the nervous system is monitoring the eye itself to control the amount of light which needs to be admitted.

The body's response to infection is also under the control of the nervous system. Bacterial "invasion" can impose specific forms of irritation onto tissue in ways which damage the cellular structure beyond the limits of its normal spectrum of adaptability, wherein the expression of life becomes impossible. Yet, infection in the great majority of instances is contained within a circumscribed area.

Even at the moment of invasion the nervous system is intimately involved in the "battle" between micro-organism and tissue cell, setting into motion neural discharges which identify the specific character of the irritation or injury. Such information plays the leading role in the ultimate design of specific reactions which contain and destroy the invader. Information regarding the entire episode is stored in the nervous system as a defense mechanism of functional behavior specifically designed to increase the body's resistance to possible future re-infection by the particular micro-organisms.

An example of how the nervous system acts to impart immunity to bacterial invasion can be illustrated experimentally through the reaction known as active local immunization.

If the skin of an animal is exposed to "antigen" for approximately 24 hours prior to an experimental live virus inoculation, the virus will be unable to overcome the defense mechanisms of the tissues. If, however, the nerve which monitors the sensory field of the exposed skin is destroyed prior to application of antigen, local immunity will not develop. Inoculation with live virus under these conditions will produce severe infection. Health may therefore be said to represent an intelligently controlled balance between forces of stress, and the ability to adapt.

This balance can be toppled from two directions. The external stress can so overwhelm the tissues that no amount of internal nervous adaptation can absorb the shock, and damage to the tissues will result. In contrast, the internal nervous component of control of all cellular activity can be changed in such a way that the full range of tissue adaptability to stress is reduced, seriously impairing the body's maximum defense potential.

The explanation of disease as a failure of adaptation to environment is perhaps the most significant concept to come out of medicine in this century. This concept contradicts the premise that every "named" disease has a separate etiology; reiterating the far more dynamic idea that each disease has a common denominator with all others; to repeat, failure of adaptation within the organism. However, to qualify the above statement, it is not the intention of this work to ignore the existence of recognized environmental factors that contribute to the establishment of a peculiar pathological condition that gives a "disease" its appearance as a classical entity.

Certainly it is obvious that a renal disease will have different clinical manifestations in comparison to a pulmonary disease, but this is simply because the functions of these organs are entirely different. Should a patient die of a kidney disease, it is because no other organ can adequately compensate for, or adapt completely to, the loss of renal function. Essentially the patient dies from inadequate adaptation to the renal problem. This same state of affairs applies to the pulmonary disease reference and to every other organ pathology.

Diagnostically, it is important to gauge the degree of malfunction in a given organ or system, primarily to commit or set up adequate patient management, which will minimize the effects of the stress produced by the malfunction. For this reason, and to this extent, commitment to standard orthodox diagnostic procedures is required. It is admitted that while knowledge of the individual organ or function in pathology is vital for proper patient management, what is more important by far is to evaluate properly the nature of the failure of adaptation itself. This work pioneers this concept realistically. It will be shown that adaptation is the functional response of integrated neural control, and when adaptation fails, it is a sign of loss of neural control.

The Subluxation -- a symptom of Neural Dysfunction

The principle of chiropractic, theorized around the outdated classic model of nerve root compression – the impingement of nerves within the intervertebral canal or foramina of the spinal column as the originating factor in most disease processes – served well during the developmental era of chiropractic. The concept of this impingement causing a supposed physical interference with the normal transmission of nervous impulses, also served well during this era. Both hypotheses had the great merit of providing a plausible explanation on which the actual practice of chiropractic was based.

There is growing evidence that in the majority of instances the "interference" which chiropractors have been correcting with varying degrees of success for the past 70 years is not satisfactorily explained by the two above-mentioned hypotheses.

It now seems more likely that the vertebral subluxation, rather than being the static cause of disease, can play a dual role. It may both initiate and/or reflect neural dysfunction, manifesting itself both as a cause and a symptom of a more profound disturbance deep within the nervous system.

Interference as we now understand it is neither a blockage nor an abnormal stimulation of the normal nervous impulse. Rather, it appears that that which is corrected is a build-up of neurological dysfunction which, once set into motion through various stress factors, is capable of existence without further abnormal irritation. Having once reached this state of development, abnormal function becomes a reflection of established abnormal neural control. In its superficial aspects, it is observed as a zone of reflex aberration; a change in the mode or design of appropriate response to normal stimuli. In its totality, it may represent a completely new nervous system, programmed on modified premises, responding in abnormal function, unable to integrate normal defense mechanisms, and even ultimately initiating its own pathologies.

The observation that the existing vertebral subluxation is secondary, at least in advanced disease processes, to some other more deeply-seated cause, has long eluded investigators due to a lack of appropriate systems of analysis for observing the phenomena which deny the primacy of the subluxation postulate. This is not to deny the primacy of the subluxation in the initial stages of a neuropathic* process. Quite the contrary, evaluation of clinical data indicates the "mechanical-neural" stress complex can be artificially created instantaneously without producing any noticeable change in musculo-skeletal organization. Even though there is a spontaneous and automatic reaction in such an event such action is seen to be quite capable of producing a reaction of sustained neural dysfunction in geographically associated elements of the neuromere. It is reasonable to suppose that some neural elements are, for one reason or another, more susceptible to rapidly

changing stress complexes than other tissues such as those which form the composite of intervertebral articular substance and neurodokon.

*Neuropathy as used in this text is defined as any derangement of neural activity.

From these observations it is possible to theorize that a "primary" subluxation is in fact the initiating factor of the segmentalized neuropathy. It is now understood that it is only necessary for the subluxation to be present momentarily, from a historical standpoint, to initiate a type of injury to neural elements whose latency of repair of such injury is extended in time beyond the more spontaneous recovery of the musculo-skeletal strain of the articulation. It must be remembered that the neural processes which the subluxation initiates contains internal stresses which, in future development, can produce diffuse, and seemingly unassociated, far-reaching functional aberrations. It is doubtful, therefore, that what is judged in the clinical examination of the patient to be a subluxation is ever the initiating cause of the disease process. The observed spinal abnormalities are more likely the products of a neurological disintegration of structural control – an advanced stage of a process proceeding throughout the nervous system – originating from the point in time of its original creation.

Unless advances are made beyond old mechanical concepts, into concepts embracing the neurological factors associated in the disease process, one finds it difficult, if not impossible to explain the great paradox of chiropractic – that different adjusting techniques, based on conflicting premises, often produce the same impressive clinical results.

The vertebral subluxation becomes more subtly understandable when viewed as a symptom of an aberrant postural reflex which is normally inter-segmentally associated through nerve networks located on each spinal cord level. Such sensory-motor neural control must be totally integrated to produce coordinated motion in the spinal column as a whole unit. The etiology of the vertebral subluxation may well be physiological or mechanical trauma to the proprioceptive fibers, a neurological insult to the nervous control mechanisms servicing the articulation. This action would result in a deranged appreciation by the appropriate spinal and cerebral centres of the position in space of the respective vertebrae.

It is, therefore, an over-simplification to interpret the muscular splinting which accompanies injury to the spinal articulation as being a mere facet of a normal defense and repair mechanism. It is more likely that such behavior should be recognized as one of the manifestations of the sequential development of the independent neuropathic entity. Similarly, insulin injections are followed by a drop in blood sugar level if the nervous system is functioning normally, but initiate no change at all in blood sugar level while the nervous system is anesthetized and thereby unresponsive. Potassium cyanide in lethal dose will cause convulsions and sudden death through the neuropathy initiated in a responsive nervous system, but an anesthetized animal shows no symptoms at all. The poison is excreted in the saliva and the animal arouses from the anesthesia quite unharmed. Likewise, the majority of clinical symptoms, fever, changes in blood count, and

even antibody production are all the results of nervous reflex action. Caution must be taken in the evaluation of local signs of dysfunction, since it is difficult under the best clinical conditions to distinguish accurately between functional derangement reflecting abnormal neural control, and either extreme of hyper- or hypo-function within the normal range of controlled adaptability.

Sequential Development of the Neuropathy

Chiropractic theory equates any deviation in mechanical co-ordination of physical movement between spinal segments as evidence of a functional derangement of primary importance in any disease process.

In order to understand the new objectives of a chiropractic analysis, it will be necessary to define the role of physiological indicators in the diagnosis of a localized neuropathy and posit the classification of forms of neuropathy. This will enable us to present the hypotheses of the mechanics of the disease process as it might appear in classic form.

Definitions of the following types are not intended to be so wide as to embrace variations which admittedly occur outside such theoretical classification. They are intended only to aid the reader in understanding the underlying principles.

Through the full spectrum of functional derangement, from simple fatigue at one extreme, to advanced degenerative diseases at the other extreme, there is one common denominator – neural interpretation of stress of cellular activity, either structural or functional, via direct or indirect communication.

The nervous system, acting in its capacity as coordinator of all functional activity, exhibits a high degree of adaptability to a wide range of micro-trauma or physical insult to its integrity. It is of interest here to attempt only a classification of the events which follow the stress-insult of injury which exceeds the normal adaptative capacity of such functional integrity.

Two mechanisms of neural control – vasomotor control of thermal regulation and spatial or positional orientation of spinal movement – are used as indicators of the efficiency of adaptation to stress. Both mechanisms have been part of the chiropractic diagnostic armamentaria since its inception. The state-of-art has steadily progressed, and present evaluation is a continuum of earlier explorations.

The degree to which each of these systems of neural control is capable of producing a uniform and appropriate response to thermal and mechanical stress stimuli is known to be indicative of the progression or regression of any disease process.

Using these mechanisms as isolated examples, a sequence of events can be described which may follow a stress-insult of injury. These events have been evaluated in the past decade from clinical data.

It must be understood that it is only for academic reasons that there is justification to try to divide or isolate nerve circuits according to the functions which they perform. At no time is it

permissible to speak of independent nerve circuit action, since the basic function of neural control is total integration of all functional activities.

Classification of the forms of neuropathy of segmental reflex mechanisms can be made according to type and kind of resultant dysfunction of elements controlled by such mechanisms.

Three major divisions of "stress-insult" may be identified;

1. Micro-trauma of cellular tissue (as opposed to nervous tissue). The injury of stress damages tissue beyond its capacity for the immediate recovery of its bio-chemical equilibrium, and this requires time for repair. Neural control "recognizes" such injury by reducing functional demands and initiating responses which set the organism on "guard" against future exposure to new trauma, i.e., local inflammation.

2. Trauma extensive enough to damage nerve endings. Injury to nerve tissue is of far greater significance than injury to any other type of tissue as it has the potential capacity to modify the neural image of appropriate control of functions which are contained within the nerve circuits with which it is connected, for example, the entire neuromere. Whether or not a given injury will produce a neuropathic change in nervous function appears to be dependent on the following:

(a) The order of prime importance of the function under control of the neural network containing the injured elements.

(b) The degree of dependency on summation between inter-segmental links of a given reflex mechanism necessary to produce co-ordinated impulse characterization.

(c) The number of fibers affected in the injury.

The probability of the neural elements degenerating sufficiently to establish a neuropathic behavior can be estimated by consideration of these three factors.

3. Referred, or second-order trauma.

In so far as every hypothetically discrete neural reflex mechanism is in reality interrelated and interdependent with other reflex mechanisms, traumatic dysfunction in one zone will result in some degree of aberration in associated zones. The degree of aberration will depend on the strength of association and this will be symptomatically interpreted in hyper- or hypo-function, depending on the innate nature of the individual mechanisms to stimulate or inhibit.

Micro-trauma, the first classification, could, under different circumstances, be included within the normal range of adaptation. However, it is listed as the first phase of a neuropathology for the obvious reason that in most instances a stress episode is composed of a series of injurious

events occurring almost simultaneously. Placing the organism on "guard" therefore, only acts to set the stage on which the neuropathy can develop; locating the neural components on centre stage, so to speak, in a manner which makes such components extremely vulnerable to injury.

As noted in number two above – local nerve trauma – the primacy of the function under control is an important factor in the consideration of the probability of establishing a neuropathy in a reflex mechanism. In the emergency type reactions to stress, either localized or general, primary functions (such as vasomotor control of blood volume and distribution, tone of digestive tract, secretion of hormones, conversion of stored energy, and the increase of sensory and motor responsiveness) dominate the neurological scene increasing the probability of their being injured by subsequent stress factors.

It is imperative that the reader be able to distinguish the difference between the deviation in function as classified in number one and number three (local or distant) above, and number two. Number one and number three in reality, represent only a restriction or incoordination of neural activity. Number two represents the distinct loss of functional identification and control of peripheral tissues, all of which results from cellular damage of a neural control mechanism.

A distortion of the neural imagery contained within a nerve circuit will be shown to exhibit the capacity to exist as a separate and distinct entity in comparison to its previous integration with associated networks. Peripheral manifestation of its existence is always observed as a complete dissociation between the neural mechanism and the cellular elements normally under its control. We will demonstrate that this becomes the self perpetuating vicious cycle – with or without the local subluxation within the cycle.

Regardless of the manner in which it was set into motion (thermal, mechanical or chemical stress) the segmental neuropathy, once established becomes self-supporting in the sense that the initiating factor need not remain as part of the abnormality for the process to continue to exist and extend itself.

Such a peculiar characteristic behavior defies any explanation based on old concepts; explanations which are still in vogue today to describe this type of neuropathy. The popular concept of nerve "lesion" as used in orthodox medicine, or nerve pressure, once commonly used in chiropractic to explain dysfunction of a motor unit as muscular activity for example, more aptly defines the "side effects" of normal neural components to abnormal stress. They have been forced into extremes of functional adaptation simply by being in contact with the neuropathy. Continuous strain is imposed onto these associated networks until a new conditioned reflex of the total complex is impressed as a new behavior pattern upon the central nervous system.

Deviation from the normal range of neural co-ordination usually results in a diminution of control of respective functions. It is as though the nerve networks become insensitive to fine increments of functional changes under their control. The total process – the neuropathic element,

and constellation of associated aberrant neural mechanisms – progresses toward higher degrees of abnormality or regresses to dissolution and return to normal depending on the degree of strain produced on the organism and the inherent ability of its adaptation.

Early in the development of chiropractic it was as difficult to explain clinical successes as it was to explain clinical failures, because the theories were based on orthodox concepts of neurology and pathology.

Orthodoxy denies the existence of a qualitative factor superimposed on the quantitative response of a neuron to a given stimulus. Yet clinical evidence illustrates the role of deranged neural function in the eventual debility of any organ or tissue. In the eighteenth century, researchers recognized that a damaged or injured nerve element was potentially more dangerous, from the standpoint of ultimately producing degeneration and pathologies in the tissues supplied by the nerve, than complete severance or immediate destruction of the nerve. Although a qualitative tone to the impulse would aid in explaining neural interpretation of varying stimuli, qualitative characteristics have not been observed through experimentation. While measurements are not yet fine enough to prove such a conjecture it is the present belief that qualitative characteristics are an inherent property of all neural activity. It is this factor which ultimately brings to reflex neural control an image of the cellular behavior of the tissues in which most nerve fibres terminate at the periphery.

As cellular bio-physical and bio-chemical behavior moves through the entire spectrum of processes concerned with its normal adaptability to stimuli, the tone of neural response (to stimuli for which it is specifically sensitive) is modified. A graded variance of neural tone could be estimated to affect the conduction velocity of the impulse. It is reasonable to suppose that the conduction velocity of impulse transmission would reach its highest value at the center of the spectrum of cellular activity wherein optimum physical and chemical equilibrium exists. Above or below this optimum it is equally reasonable to suggest that the conduction velocity will diminish in decrements to a base value. It is probable that one of the reasons that such changes in conduction velocity nave not been observed, is due to the fact that stress associated in the methods of experimentation have reduced the elements to this base value.

For our purpose it is sufficient to use the antidromic impulse associated in the vasomotor control of dilatation of blood vessels in the skin as a model which quite adequately describes the neural capability of qualitative action. The neural mechanism of motor-receptor units, designed to control function, has, in addition to “memory” of the appropriate response to specific demands, an impressed image of the cellular physio-chemical characteristics peculiar to the specific tissues involved in the given function.

The biological integrity of any tissue is identified through its cellular response to the command of the nerve impulse. It is, in effect, controlled by the specificity of that impulse which is created and generated by neural elements containing the image of that tissue.

Final decision on the validity of this hypothesis must at this time be left to the future. It is more important to satisfy the purpose of establishing this concept – to give meaning to chiropractic principle and a better understanding of its clinical application. Having described the neuropathy of any neural mechanism as the primary locus for deranged function there remains only a need for description of the role of such a neuropathy in pathology.

In 350 B.C. Aristotle considered the warmth of the body to emanate from the heart. Fever then resulted from an abnormal heart action. In 1648 vital spirits were cited as the cause. About 1773 friction of the blood was named. That the central nervous system was an influencing factor was not discovered until 1852 when the vasomotor control mechanism of thermoregulation was described. Fever is accepted today as resulting from the "setting" of the human thermostat in the brain at a higher value, adjusting vasomotor function accordingly. There still remains the question as to why the thermostat behaves in this manner. Reasons are advanced that a fever state is a natural defense mechanism in combating infection. Others wonder at the role of toxins circulating in the blood stream as possibly being the contributing factor deranging the central control of thermoregulation.

From our foregoing definition of the form of neuropathy observed on segmental levels of the spinal cord, one must now recognize clinical evidence of generalized hypertension of the small arteries of the skin, and relative hypo-tension of the superficial capillary bed in fever states as exhibiting the same type of behavior as seen in the segmental derangement. That fever is associated with infectious diseases, toxemias etc., cannot refute the primacy of the neural involvement as being a first order of pathological events. This neural involvement only identifies the bacteria or toxin as a nerve irritant or as an element in the advanced stages of a pathological process which has expanded unobserved through successive stages of debilitating associated neural mechanisms concerned in the process of immunity. The bacterium, virus or toxin "invades" the organism and a "battle" between organism and invader ensues. The presence of an "invader" and the pathological forms which the "battle" may take are valuable only as indicators of the course and development of the final stages of the pathological process, (the debilitation of neural control). If there is an "invader" it is the original segmental neuropathy. If there is a "battle" between organism and invader it is a battle fought deep within the nervous system between the original neuropathy and "healthy" associated neural mechanisms of control. The appearance of the microbe only testifies to the fact that the original neuropathy was successful in debilitating associated healthy mechanisms, thus extending its influence throughout the nervous system to involve the processes of immunity.

Just as fever and the microbe are indicators of the extension of the neuropathy throughout the nervous system, similarly, symptomatology of all other functional derangements or pathologies can now be viewed as indicators of neurological aberration. Classification of symptoms into diseases would serve a more worthwhile purpose if such classification was directed toward the evaluation of the particular course of development which the neuropathy was taking in its extension into associated fields of neural control.

Segmental Neuropathy of Thermal Regulation

In our study and use of skin temperature as an analytical indicator of abnormal nerve function we qualify any interpretation of our findings with a full appreciation of the complexity of the interactions of the physical, chemical, and neural mechanisms involved with heat transfer.

Considerable research data has been compiled on the subject of skin temperature and its rate of change under various physical and physiological conditions. It is not the purpose of this paper to give the reader a detailed resume of all experiments performed in this field, but rather to list, as simply as possible, certain well substantiated facts which bear directly on our system of analysis.

In the study of skin temperature it is understood that definite physiological and natural laws are involved which impose certain limitations to the practical use of this type of analysis. Because of this, it is well at the beginning of this study to realize the fundamental factors involved in the thermal exchanges existing between Man and his environment. These may be listed in the following main categories:

1. HEAT PRODUCTION – Tissue metabolism; the source of all heat production.

2. HEAT LOSS – Factors involved in heat transfer and dissipation.

For our purpose it is convenient to define metabolism as the process of energy transformation within the body, whose chief product is heat. Factors such as the simple ingestion of food, muscular activity, emotion, and certain dis-ease conditions will influence the metabolic rate and thereby change important relationships which exist between heat production and heat loss. It is understood that the internal body temperature must at all times represent the balance struck between the heat produced by metabolism and the heat lost to the environment.

Before attempting to explain the avenues through which heat is lost or dissipated to the environment and the factors which will influence this loss, it is desirable to include at this point a basic explanation of HEAT.

Sensory organs of the skin provide man with a rough subjective measure of temperature, but for scientific purposes a more exact temperature scale is required. *Measurements of temperature are based on the observation of changes in physical quantities,* e.g. the length of a column of mercury in a thermometer, which, because of thermal expansion, increases with temperature. Observation of the pressure in a fixed volume of gas also gives us a temperature scale, and illustrates an important principle of thermodynamics – *Heat is a form of energy.* As we put

heat into the gas its molecules move more rapidly, i.e. their energy increases, and their greater force of impact on the walls of the container produces an increase in pressure.

A simple definition of temperature is obtained by saying that heat flows from places of higher temperature to places of lower temperature. We must now look at the various ways in which such a transfer can occur. Imagine a cold box with a very hot object pended inside it by means of a metallic wire. Suppose we have a vacuum inside the box. The object loses heat by *radiation*, i.e. heat flows to the walls in the form of electromagnetic waves. Radiation is the process by which heat reaches the earth from the sun. The object also loses heat by *conduction,* since the ends of the metallic suspending wire are at different temperatures, and heat flows along the wire from the higher to the lower temperature. An important difference between the two processes is that conduction only takes place through matter, whereas radiation can travel through a vacuum. Let us introduce gas into the box. The gas near the object is heated by contact with it, and rises, thus carrying heat away from the object. This process is called *convection,* and the so-called radiators used for indoor heating use this process.

When we have gas in the box, the three modes of heat loss are all present together. An important experimental result is *Newton's law of cooling*, which stales that the rate of loss of heat of an object is direct proportional to the temperature difference between the object and its surroundings.

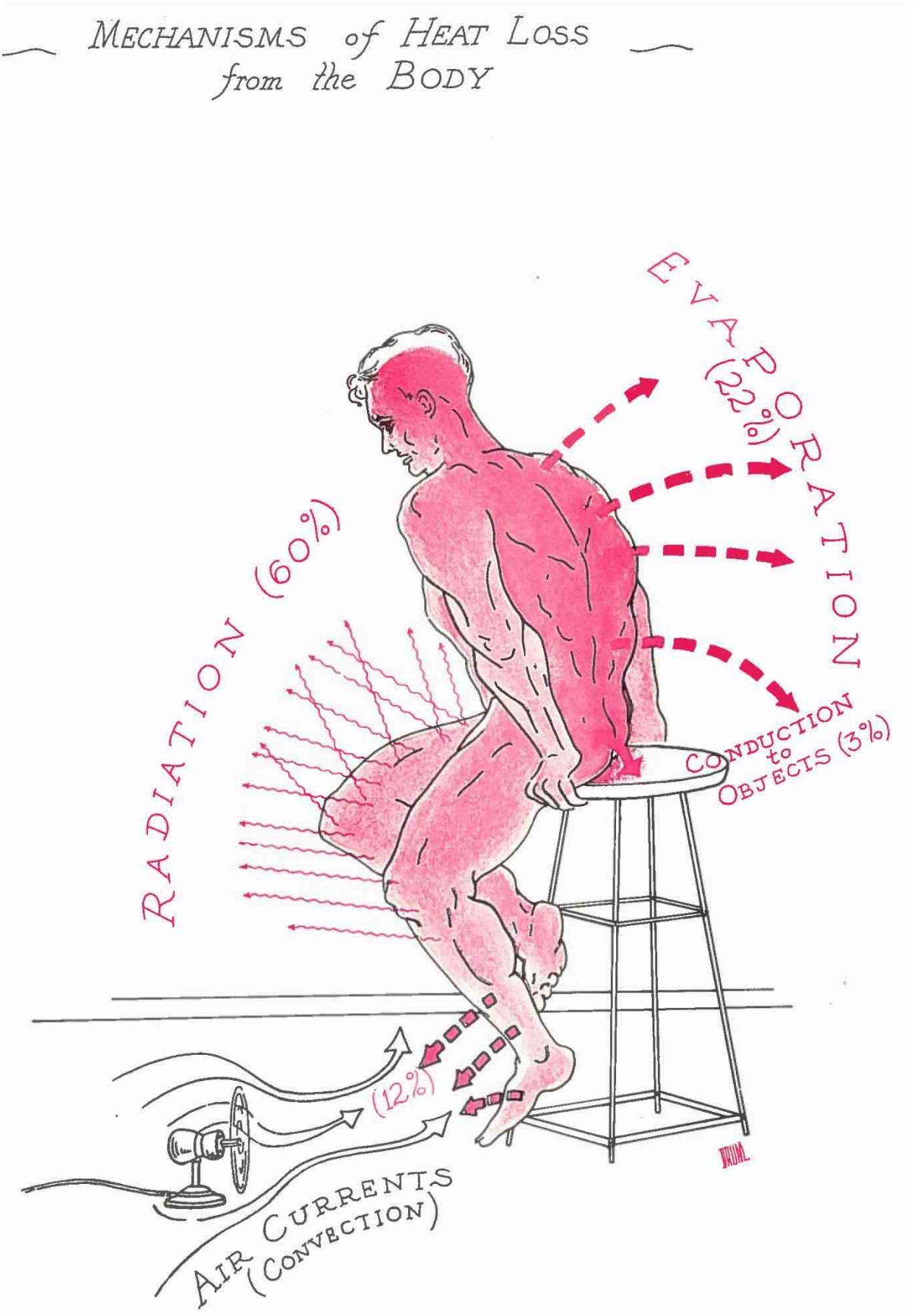
The human body uses the above three ways of heat transfer, and also the process of evaporation (in sweating). The process is illustrated by putting ether on the skin. A cooling is felt, since the rapidly evaporating ether carries away heat with it. The relative contribution of the various processes to the cooling of the human body depends on the environment.

A given material may be characterized, as far as heat flow properties are concerned, by giving its *specific heat and thermal conductivity*. If we heat one gram of substance through one degree Centigrade, the amount of heat we put into the gram is defined to be the *specific heat* of the substance, and the unit of heat employed is the *calorie*, which is the amount of a heat involved if we use water as the substance. Thus specific heat is given in terms of calories per gram.

When conduction occurs it is found that the amount of heat flow per unit area through a substance is proportional to the temperature gradient, i.e. the rate of decrease of temperature with distance, and to a quantity called the *thermal conductivity* of the substance.

Suppose we have a wall of material with the same temperature on both sides, and we suddenly increase the temperature on one side. Heat begins to flow through the walls, at a rate proportional to the thermal conductivity of the wall material. As heat reaches the interior regions of the wall, they begin to heat up, at a rate which depends on the specific heat of the wall material. Finally, a state of *thermal equilibrium* is reached, in which the temperature does not vary in time but varies smoothly through the wall, while heat passes through the wall at a fixed rate, which is

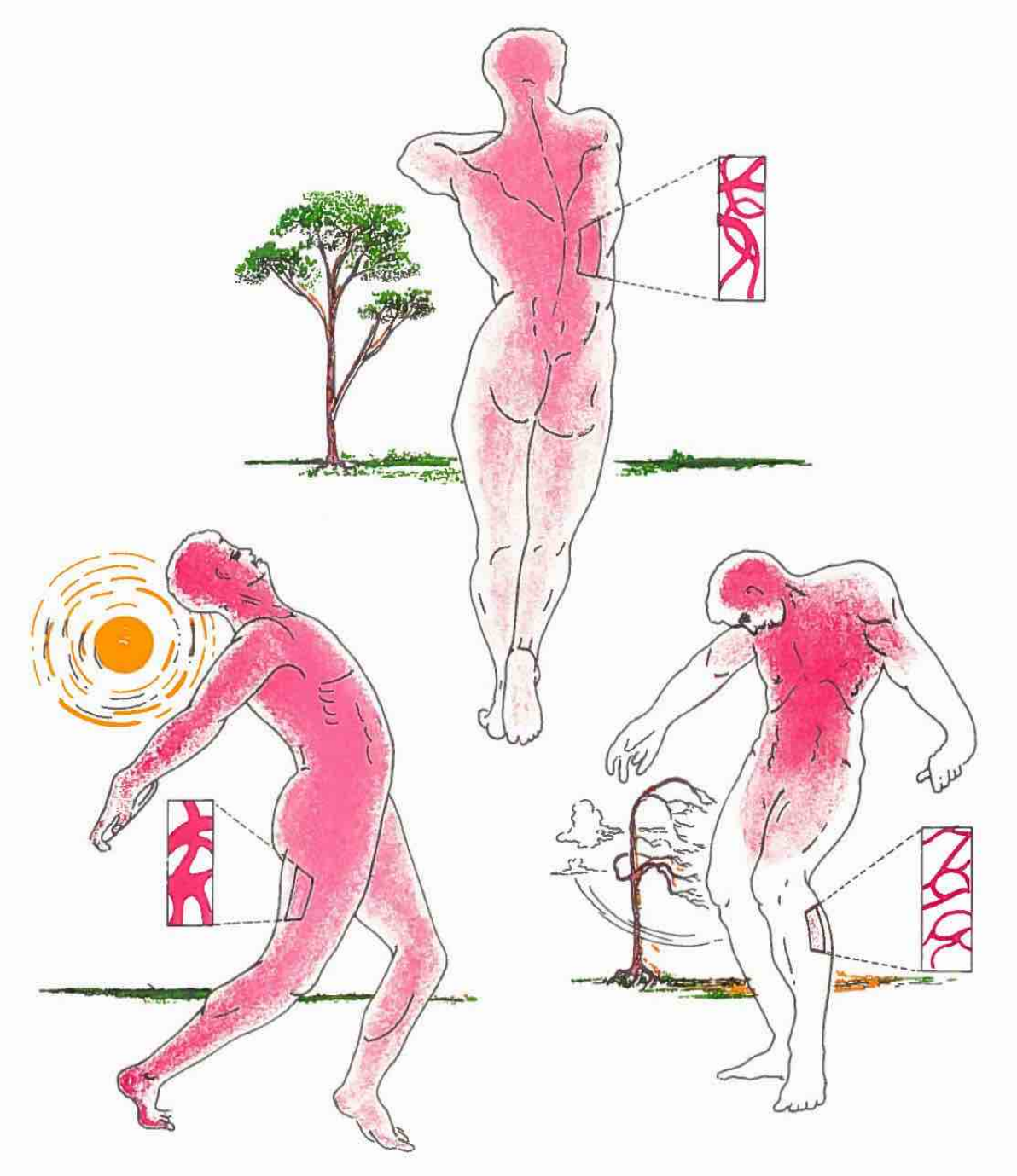
proportional to the temperature difference across the wall and the thermal conductivity, and inversely proportional to the wall thickness. The final rate of heat flow depends on the thermal conductivity, but the time taken to reach equilibrium will increase with the specific heat, since the heat flow can slowly heat up the wall if the specific heat is high.


Mechanisms of Heat Loss from the Body
Evaporation (22%)
Radiation (60%)
Conduction to Objects (3%)
(12%)
Air Currents (Convection)

Modes of Heat Transfer

Under the ordinary conditions of everyday life about 60% of total loss of heat from the body is accounted for by the process of radiation. Convection of course depends on air temperature and rate of movement, but in ordinary room conditions in a resting state a patient loses about 15% of his total heat loss by this means.

Vaporization of water is not dependant on the secretion of sweat entirely, since fluid moving out of the peripheral capillaries seeps into the epidermis from which it passes to the environment in accordance with the existing laws of vapour pressure of the atmosphere. This fluid loss accounts for from 22 to 27% of the total heat loss under ordinary conditions.



Zones of Vasomotor Control

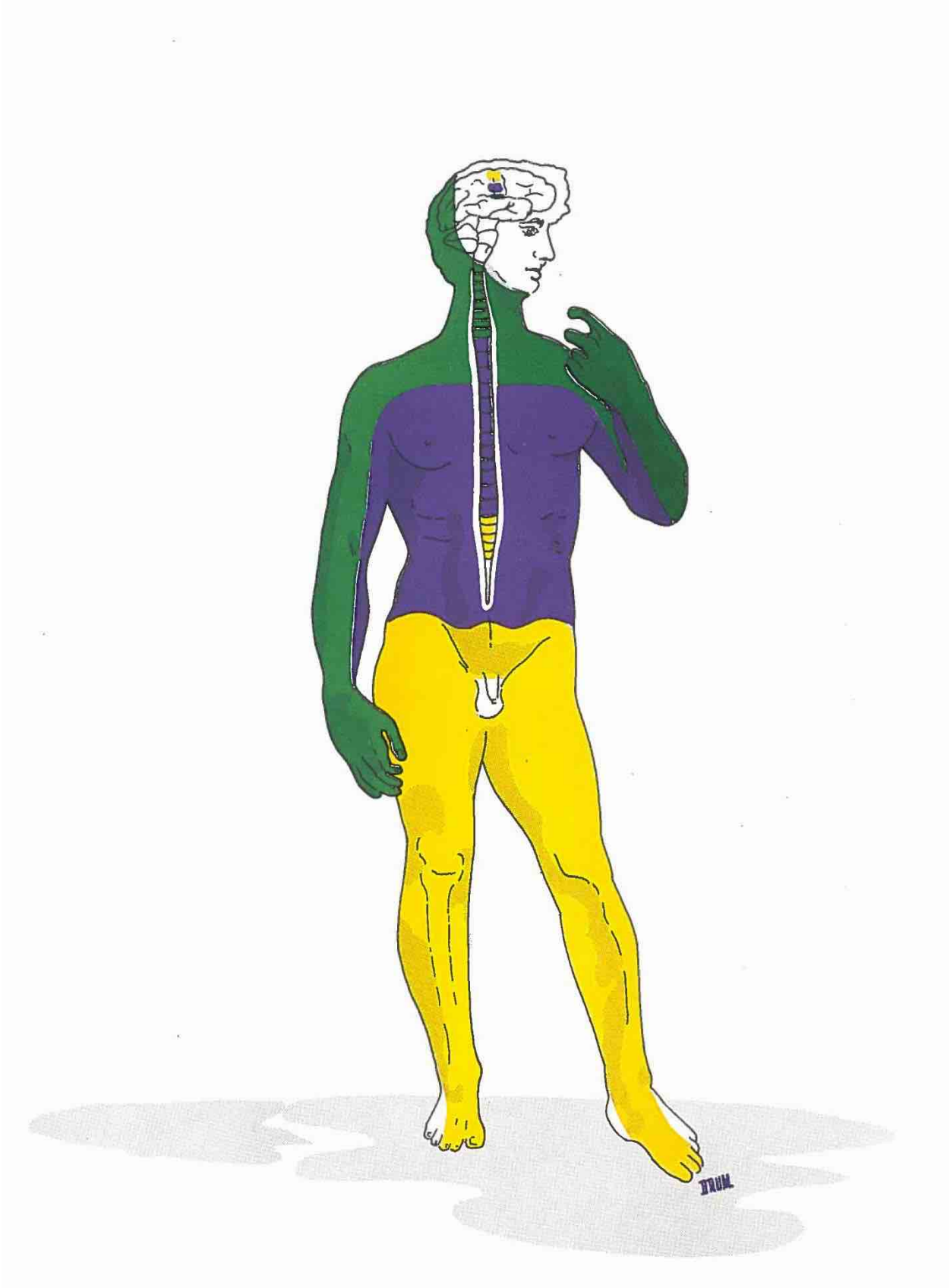
In ordinary room temperatures and resting metabolic rates, heat moves from the surface of the skin to that environment in a well defined manner maintaining this surface at a temperature level considerably lower than internal temperature. It follows therefore, that immediately below this surface there is an area of tissue which will exhibit a progressive increase of temperature with increase in depth until the level of internal temperature is reached. This area is called the internal temperature gradient.

It is the study of this gradient, estimating the depth, and the reasons for its existence, which are of primary interest to us in our system of skin temperature analysis.

Experiments conducted by Winslow, Herrington & Gagge show that clothed, semi-reclining subjects are able to maintain an easy balance between heat production and heat loss by the vasomotor control of the rate and volume of blood flowing through the skin in environmental temperatures between 77 to 88 F. This type of thermal regulation is described as being the *"Zone of Vasomotor Control."*

When environmental temperature drops below 77 F. we find that there is no control of heat loss; the body's internal temperature can be maintained only by chills. The blood vessels of the skin are normally constricted thus the body cools as an inanimate object in accordance with Newton's Law of Cooling which states: the rate of cooling, indicative of the rate of loss of heat, is directly proportional to the difference of temperature between the body and its surroundings. When this condition applies it is described as being a *"Zone of Physical Cooling"* – purely physical factors of heat loss dominate.

When environmental temperatures raise above 88 F. the process of sweating starts, increasing in volume proportionately with temperature. Peripheral blood flow also increases with increase of environmental temperature. Cooling of the body is adequate; the general level of body temperature is higher; pulse rate increases with the increase of temperature. This condition is classified as the *"Zone of Evaporative Cooling* with Vasomotor Adjustment".



Sensory Control

Conscious awareness of environmental temperature is interpreted in the brain from a pattern of impulses generated in extremely sensitive nerve endings situated just beneath the surface of the skin. This nervous mechanism does not identify external temperature in actual degrees, but rather is designed to monitor the rate at which internal heat is being lost to the environment. Because the body has a certain weight and size it is subject to the same laws of heat transfer as apply to inanimate objects. It is imperative that the quantity of heat generated within the body as a product of cellular activity be held within a very limited range of temperature at all times regardless of the large variance in internal heat production which results from physical activity or an increase in environmental temperatures. Thus, this conscientious recognition of environmental temperature alerts the mind to the intricate interplay proceeding to seek thermal equilibrium between the purely physical processes of heat dissipation and internal heat production. Should heat loss proceed too slowly, due to increased physical activity, or an extremely warm environment, the need is felt to rest from such activities or seek a cooler environment. At the opposite end of this thermal spectrum where heat is lost to a cold environment in greater quantities than it is being produced within the body the desire is felt to reduce the rapid loss by seeking a warmer environment or increasing physical activity, thereby, elevating internal heat production. When physical activity is reduced to a minimum in a relatively cool environment it is interesting to note the physiological adjustments in the rate of blood flow between different parts of the body which are necessary to compensate properly for the different rates of heat loss due to the difference in the effective radiating surface area in relation to internal mass.

In an environmental temperature of 64° Fahrenheit, the unclothed body, at a resting metabolic rate, will exhibit both extremes in the adjustment of blood flow. Because heat is lost more rapidly from the limbs of the body than the trunk, blood flow is reduced to a minimum quantity through constriction of the blood vessels just beneath the skin surface of these parts. In contrast, the trunk of the body, because of its larger mass, loses heat more slowly, therefore the blood vessels of the skin will be found to be in a state of maximum dilation. As either the environmental temperature increases, or some physical exertion is made, it is observed that the involuntary physiological response is a gradual release of the constriction of the blood vessels of the limbs. The fingers and toes, being the most efficient radiators of heat because of their relatively larger surface area to internal mass are utilized to accommodate approximately 60% of the total physiological adjustment to any particular thermodynamic relationship which may be encountered between internal heat production and heat transfer to the environment. This reciprocal action of shifting blood volume between the areas near the surface of the body and the internal organs requires an intricate network of control over the expansion and contraction of the vascular beds in the respective areas.

As we now view the nature of any derangement of neural activity as being an abnormal perversion of appropriate neural response to normal stimuli we see the ramifications which are

possible through the expansion of even a single element of control which might be so affected in the vast communication and control network of the single function of maintaining an internal constant temperature.

The course of progress of a localized neuropathy on a spinal level in the vasomotor control system theoretically can proceed along direct pathways to its highest order of abnormal sophistication which is its ultimate debilitation of the highest order of neural integration found at the level of human consciousness in the cerebral cortex.

Such a phenomenon is observed clinically in certain types of psychotic behaviour, where the interpretive centre is depressed in association with other facets of mental derangement. That the neuropathic process takes this particular course of development is of course entirely dependent, as it is in any disease process, on the particular configuration of neural elements which are, by chance or probability, drawn into the orbit of influence of the original process. The phenomenon of reduced sensitivity to temperature is not limited to psychotic degeneration but appears clinically in all diseases to a greater or lesser extent, being delimited to the section of skin enervated by the affected neuromere exhibiting neuropathic behaviour of vasomotor control. Such evidence would tend to validate the hypothesis that the nerve pathways of temperature sense and those which control the rate and volume of blood flow through the skin are synergistic. It is possible that one sensory pathway serves both functions as hypothesized in the following section.

Central Control

Normal body temperature is basically the expression of a thermal equilibrium which is maintained between the varying modes and fluctuations of internal heat production and external elimination. The control centre, not unlike an electric thermostat, upon proper stimulation is designed to actuate certain serialized events which directly modify all factors concerned with internal heat production and its physical transport to the environment.

The human thermostat in addition to sensing temperature changes, represents a highly sophisticated centre for processing data constantly arriving from all parts of the body, which are pertinent to the thermal equation of heat loss. The temperature of the blood arriving at this point is utilized as a gross measurement for the extent of thermal balance between production and elimination.

When internal heat production exceeds the physical capabilities of heat elimination, the blood temperature is elevated. The detection of an increase in blood temperature by the thermal receptors in the brain is identified as being indicative of an increase in the delay in transportation and ultimate dissipation of heat to the external environment. The speed at which blood temperature rises from a "norm" further indicates the speed at which he thermal imbalance is developing. Depending on the rate of this change, the thermoregulating centre acts to modify the behavior of both general and specific functions directly involved with the transport and dissipation of heat. Such action is a graded response formulated to equalize the immediate and the anticipated deviation in thermal equilibrium in the shortest possible time. Rapidly rising blood temperature, therefore, calls forth a response designed for more rapid compensation than slow rising temperatures.

It may be stated as a working hypothesis that an increase in blood temperature 'triggers" an established pattern of neural discharges which proceed through higher and lower brain centres to integrate functional activities which facilitate adaptation to thermal stress.

The primary role of cerebral control over the functions regulating heat dissipation is one which establishes the tone of the autonomic nervous system.

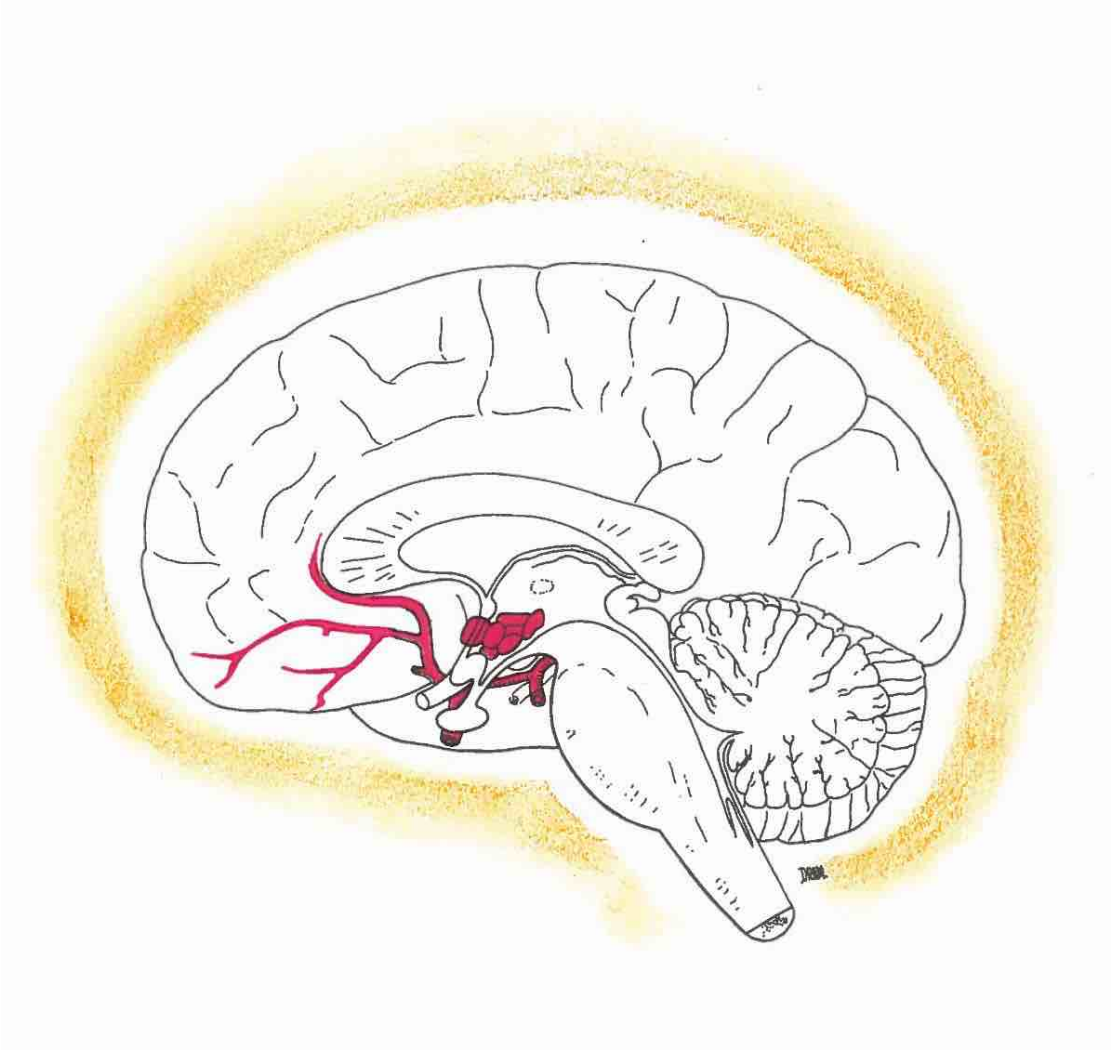
Of equal importance is the passage of sensory information regarding the environment, how favorable or unfavorable it may be for absorbing body heat, to the cortex giving awareness to the state of thermal balance.

Cerebral control acts through reflex control on systems which regulate the water-balance of the body, directly through the following avenues:

1. Redistribution of blood – by shifting the fluid concentration from internal regions to the periphery heat loss is facilitated.

2. Controlling variations in blood volume – by varying the blood viscosity the conductivity is varied without sacrifice of function capacity of blood.

3. Controlling circulation rate – To facilitate heat loss the stroke-volume of cardiac output is increased with the pulse rate decreased. Conversely, to conserve heat the stroke volume is reduced with pulse rate increased.



Vascular Innervations – Constriction

The blood vessels of the skin, that is, the small arteries and arterioles leading to the capillary bed are composed chiefly of involuntary muscle fibres arranged in a circular fashion. Like cardiac muscle these muscle fibres are supplied by two types of nerve fibres – classified as inhibitory and/or excitatory. Those which cause constriction of the arteriolar musculature are called vasoconstrictor, those which inhibit, and in consequence cause relaxation of the muscular rings, are termed vasodilator.

The vasoconstrictor fibres belong to the thoraco-lumbar (sympathetic) division of the involuntary nervous system. These constrictor fibres arise from groups of nerve cells situated in the lateral horns of the spinal cord, extending in man from the first thoracic to the second or third lumbar segment inclusive. *All the arterioles of the body wherever situated are supplied with filaments whose ultimate source is this relatively limited region of the central nervous system.*

The fibres of the sympathetic system emerge from the cord through the anterior root of the spinal segment in which their cell bodies are placed. In a cross section of the anterior root they appear as fine medullated fibres. They separate almost immediately, however, from the voluntary motor fibres of the anterior root and enter the corresponding ganglion of the sympathetic chain. Thus, the spinal nerves from the 1st thoracic to the 2nd or 3rd lumbar, but not others, are connected each to a vertebral ganglion by a delicate white strand composed of preganglionic fibres and known as the white ramus communicans.

A preganglionic sympathetic fibre, after entering the ganglion, may pursue one of three courses:

I. Form synapses with cells in the ganglion which it first enters.

2. Pass up or down the sympathetic trunk for some distance to terminate in a ganglion at a level higher or lower than that of the segment from which it originated.

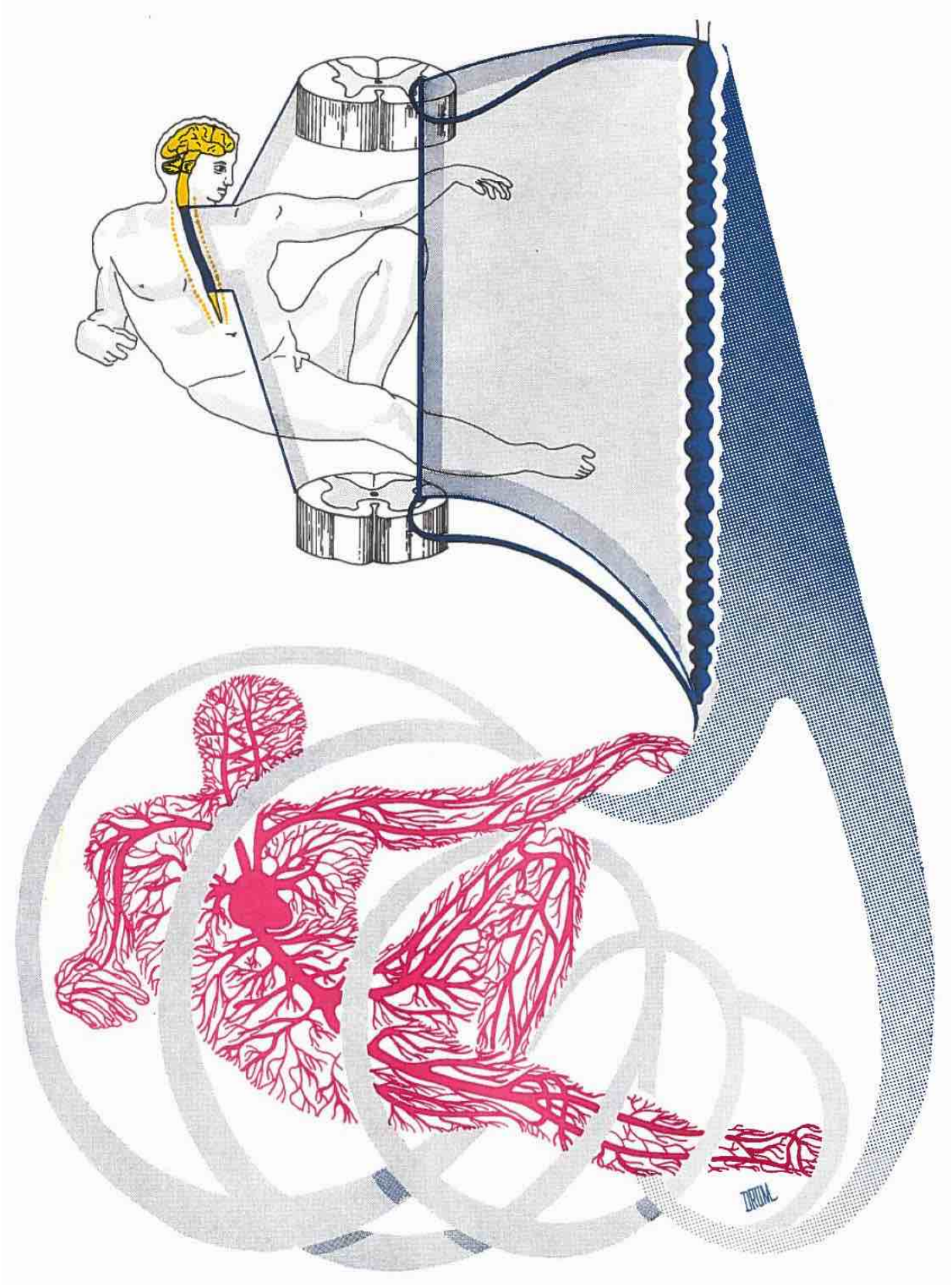
3. Traverse the gangliated cord without interruption to find a cell station in either a prevertebral or a terminal ganglion.

The ganglia of the sympathetic chain are connected with the spinal nerves by delicate filaments called gray rami communicantes. They are composed of the axons of the ganglion cells and are therefore called post-ganglionic. The gray rami in the thoracic and upper lumber regions join the spinal nerves close to the points at which the white rami arise. Their constituent fibres are continued to the periphery for the supply of the blood vessels, sweat glands and smooth muscle of

the skin. Whereas, as already mentioned, only a limited number of the spinal nerves possess white rami, every spinal nerve receives a gray ramus.

The peripheral distribution of the post-ganglionic fibres follow the course of the larger arteries, supplying short sections of these vessels with single axons which terminate in the muscular layer of the vessel.

Experimental research has shown the pattern of distribution of post ganglionic fibres has no correlation to the segmental position of the pre-ganglionic cell body in the lateral horn of the cord. Although it is known that there are sympathetic dermatomes in man, these do not correspond to the well-known sensory dermatomes.



Vascular Innervation – Dilatation

The sensory fibres, through which the antidromic impulses of vascular dilatation are conveyed, are distributed anatomically on a segmental level throughout the length of the spinal cord through each posterior division of each spinal nerve.

It becomes evident that segmental skin temperature differentials represent zones in which, because of reduced dilating tone, the vasoconstriction of the blood vessels of the skin is seen to dominate in the affected area. This cannot be explained satisfactorily, either in terms of a simple block to the transmission of the impulse, or, of a simple stimulation through abnormal irritation. If this were so, one would expect to note gross sensory disturbances accompanying the segmental skin temperature reduction. No such loss of sensation or abnormal sensation is normally observed. Further, it can be demonstrated that the neurological reflex responsible for producing the "red-flare" reaction normally elicited by various forms of mechanical trauma can be evoked within the area where the functional integrity of dilating control has been lost. Such evidence would indicate that the affected neurone is basically physiologically intact … that only the spectrum of its normal range of response to fine increments of functional adaptation is reduced leaving the mechanism responsive only to a more gross range of activity.

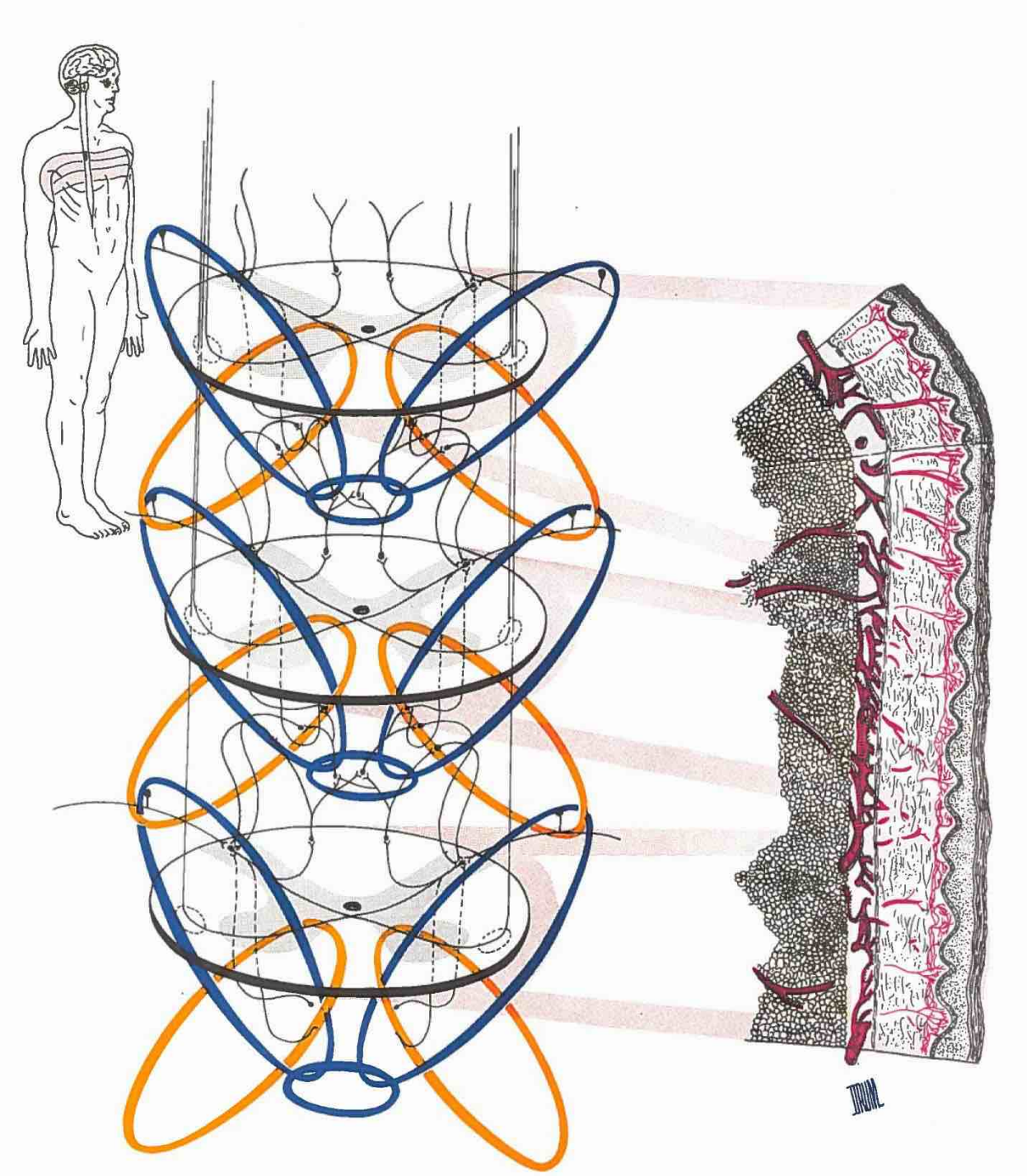
A detailed analysis of the neurological architecture of the probable inter-spinal connections of nerve fibres associated in the control of appropriate dilating response to temperature changes of the body will illustrate the basic elements which must be involved if this type of phenomenon is to be explained.

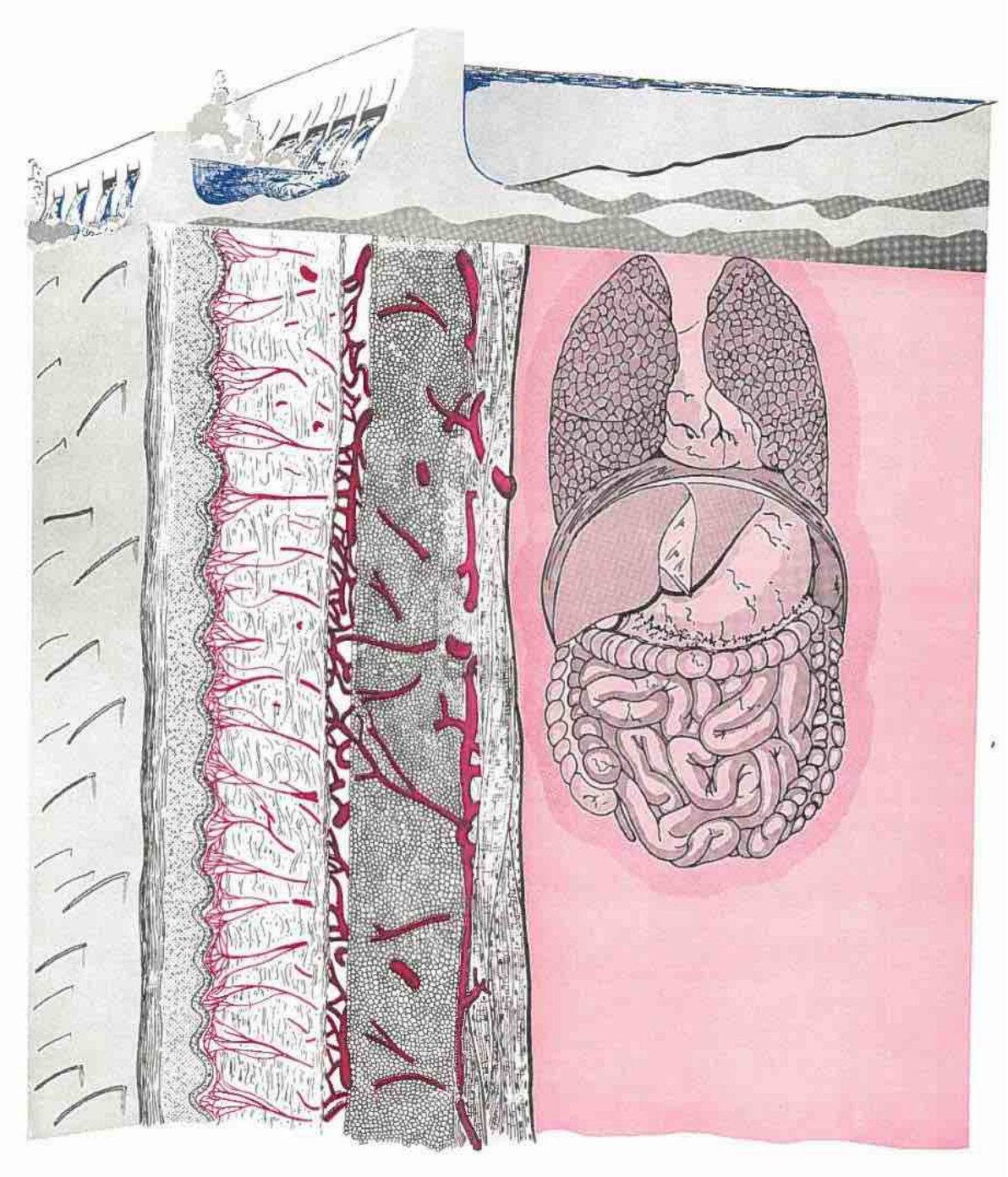
It has been estimated that approximately 40% of all fibres travelling in the posterior root of each spinal nerve are capable of transmitting efferent impulses backwards to the periphery from the spinal root ganglion. Although it is presently not known whether the antidromic impulse is conducted over fibres subserving some other function, our clinical observations would seem to indicate that this is so.

It is apparent that the fibres mediating pain impulses, because of their relatively high stimulus threshold, and the more direct course they take, with few internuncial connections, upward to higher brain centres are not involved with the transmission of the dilating impulse. More likely, only the smaller type nerve fibres which have lower threshold of response to stimuli, mediating such sensations as touch and temperature, are involved in antidromic transmission. These fibres upon entering the spinal cord from the lateral division of the posterior root, divide into an ascending and descending branch which pass to levels immediately adjacent where they make connection with internuncial neurons forming intricate and oftentimes indistinct interconnection with unilateral and bi-lateral divisions of the reflex mechanism. Together with these fibres there are neurons which pass more directly to the opposite side of same segmental level of which they enter the cord. This design of neuron distribution has been identified through

surgical experimentation as the best approximation of the known inter-segmental pathway serving the functions of various modes of sensation which show a high degree of peripheral localization. Incidentally, such localization is identical to the same distinct localization of dilating tone. Until the neurological pathways of vasodilatation are isolated, if it is possible such a feat can ever be accomplished, this design will adequately explain the neural mechanism of vasomotor control of dilatation.

The most distinct feature of vasodilatation is the functional evidence that any one spinal level is not capable of itself to elicit an antidromic response capable of dilating the blood vessels of the skin supplied by that segment. It is necessary for each spinal level to so integrate its incoming sensory data with similar elements of associated neural mechanisms above and below itself as well as with the opposite side of the body on its own level before the antidromic reaction can be produced. Neural control mechanisms of this type indicate a high order of temporal summation of incoming impulses with each link of the intersegmental control in order to bring about the highest order of appropriate local control or sensory awareness. It is evident that any deviation in the accurate timing, or distortion of the "memory" of impulse firing pattern for a given stimuli configuration will change the central confluence of incoming impulses, in such a way that the affected elements of the "neural linkage" shall fail to function. Analysing the probable neural mechanism in this way it could be predicted that any malfunction of even the smallest "link" in the chain of neural events associated in control of vasodilation would send out evidence of its existence by its failure to dilate the vessels of the skin directly under its control. The affected area of skin could lose its dilating tone in a sharply segmentalized manner if this is an accurate description of the mechanism of the antidromic impulse and vasodilatation.





Thermal Gradient

Heat flows from the interior regions of the body outward to the cooler exterior environment. To conceive of the intricate interplay existing between purely physical modes of heat transfer and its physiological regulation, one may view the process by analogy.

The internal regions of the body may be visualized as an area which exhibits a high degree of uniformity and constancy of temperature maintained within an extremely narrow range of deviation from a normal of 98.6° Farenheit. This area, appropriately identified as the "thermal core" of the body, may expand in size to include the tissues just beneath the surface of the skin if the environment is warm. Conversely, the thermal core may be reduced in size wherein its outer limits reach only to the deeper portions of the musculature of the body if the environment is extremely cold. Between the thermal core of the body and the external environment there are two distinct anatomical barriers, the skin and the subcutaneous fat, which act as purely physical insulators or dams against the equally purely physical transport of heat moving from the thermal core via conduction through the tissues to the periphery. The rate at which heat flows by the process of conduction is greatly dependent upon the resistance offered by these tissues. But heat flow is not solely dependent upon this resistance, or conductivity, of the tissues. By analogy, just as water will run downhill, always flowing to the lowest possible level, so heat, if left to itself flows down the temperature hill, always warming the cold objects at the expense of the warmer ones. The rate at which heat flows therefore, depends on the steepness of the temperature hill as well as on the properties of the material through which it has to flow. The difference of the temperature per unit distance is called the temperature gradient; in analogy to the idea of steepness of grade, which determines the rate of flow of water. It is evident that the body cannot depend on the external environment to be always at a temperature which would establish the appropriate steepness of this thermal gradient to accurately accommodate the changing quantities of internal heat production. The need to adapt to rapid changes in the relationship between internal and external temperature produces a physiological response in the redistribution of the water content of the tissues by circulation of blood.

Blood vessels, arising primarily from the muscles of the body, send perforating branches through the subcutaneous fat layer to the capillary bed which lies just beneath the surface of the skin. These arterioles are analogous to the sluice gates which can be opened or closed to regulate the flow of water through a dam. The rate and volume of blood permitted to flow through the subcutaneous fat is regulated by simple vasoconstriction and vasodilation of the vascular network of the skin. The opening or closing of these blood vessels mechanically regulates, via the functional process of forced convection of the blood stream, the volume of heat capable of passing into this area and hence, to the environment.

The sluice gate effect is achieved in the epidermis, or outermost layer of the skin, by virtue of the fact that the conductivity of this layer varies proportionately with its water content. When, by means of vasomotor control, the blood flow through the capillary bed at the base of the epidermis is increased, the water content of the epithelial cells increases. As the water content of the tissues increases, the rate of conductivity of the tissues increases, thereby, allowing a more rapid transport of heat through this most superficial layer. By contrast, when blood flow is diminished by vaso-constriction the water content of the epidermis is reduced causing these cells to become a most effective heat insulator.

The significance of the "sluice gates" of vasomotor control of thermoregulation, to the chiropractor, is that their "settings" are controlled by the nervous system. To measure skin temperature, the thermal gradient and the physical as well as the physiological reasons for its existence enables one to judge the efficiency of the vasomotor control system. To be able to judge whether this system is functioning normally or abnormally in various areas of the body enables the chiropractor to evaluate the segmental integrity of the nervous system in action.

Segmental Neuropathy of Kinesiology

The mutual relation of body mechanics and nerve function has been recognized for many centuries. Most of the healing professions have recognized this in varying degrees. The psychologists recognize total body flexion with regression into the embryonic posture as a grave problem. Even the casual psychologist recognizes the erect aggressive posture as that of positive successful action. The slumped dejected posture of defense generally implies negative stasis. Orthopedic surgeons, osteopaths and chiropractors have been doing increasing investigation into the details of this problem.

Posture

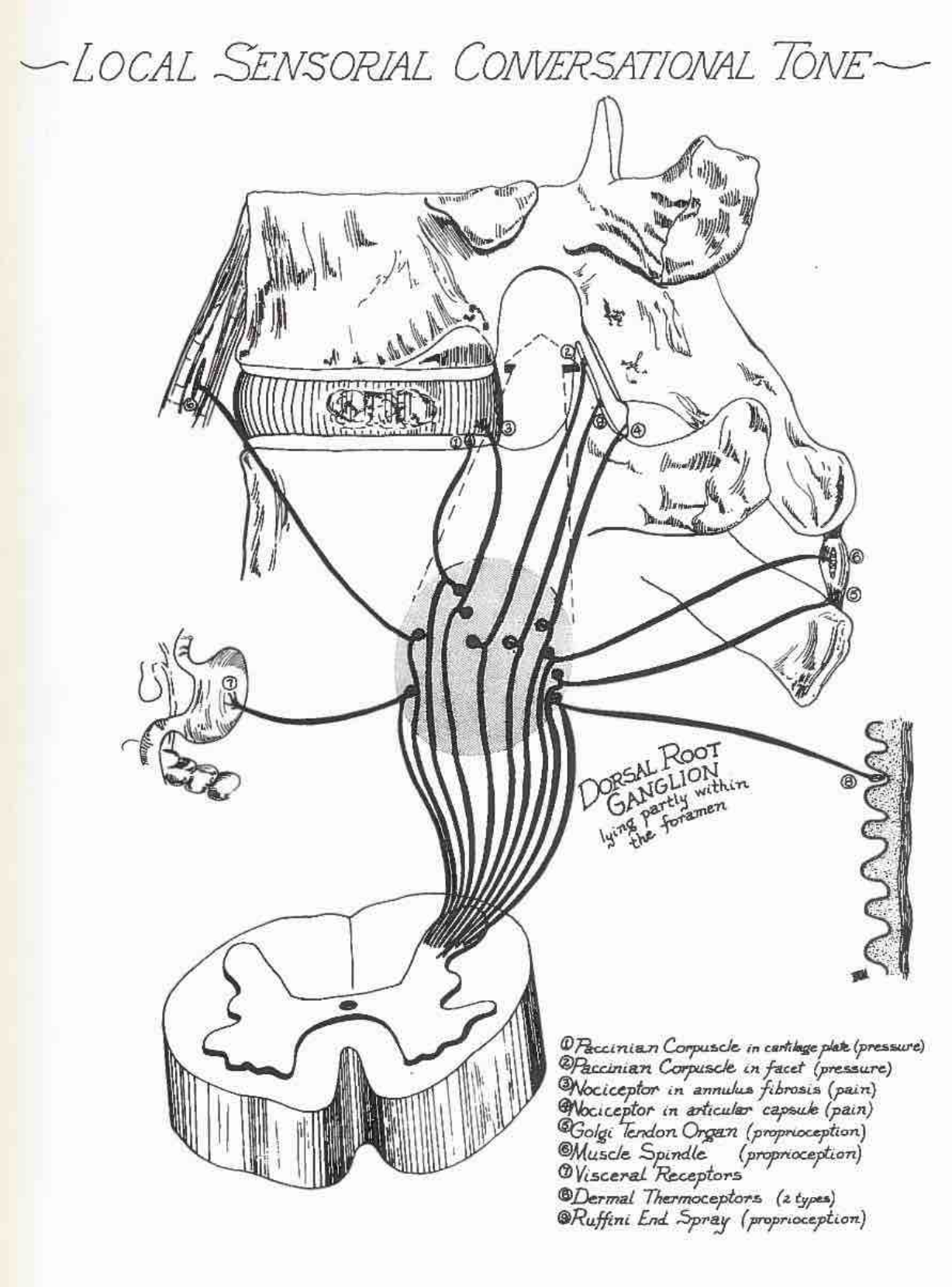
Posture can well be defined as a "spatial adaptation of the human body to its environment". A portion of this environment is the force of gravity against which our muscles are in constant antagonism. The only way one can achieve a zero gravity conflict is either to be almost totally immersed in water or else floating in space. Neither is practical. Our adaptations to the force of gravity are influenced greatly by psychological attitude already mentioned as well as by the mechanical adaptability within the neuromuscular operation of the skeletal structure. The pain of an acute subluxation or of an acute partial disc herniation will force a person into a bizarre posture to minimize pain. Some adolescent individuals are unable to stand fully erect because of inter-scapular pain which may be quite easily correctable with a few adjustments. Others assume the same posture for psychological reasons of conformity to average height. These few generalities

open many fields for investigation. One area is the mechanics of articulation between individual vertebrae.

Subluxation

An inter-vertebral subluxation is variously defined and by connotation has assumed different meanings. To the orthopedic surgeon there must be an obvious gross malposition of the articulation though still short of a complete disrelationship (a dislocation). Some still insist that there be demonstrable bone change as a result of this subluxation. By contrast many chiropractors have come to recognize that a nearly microscopic change of position which is accompanied by neural aberration producing muscular imbalance or nearly total rigidity of the articulation can be quite symptomatic. Consequently, many chiropractors at the present time use the word "subluxation" in describing the entire syndrome, the complex of structural and functional changes even though no demonstrable displacement can be measured. This has caused considerable confusion in the related healing arts and insurance fields. Most chiropractors have experienced excellent results by "adjustments" of patients whose spines were completely ankylosed. These individuals occasionally develop the entire symptom complex of a subluxation without any movement of the vertebrae at all. Animals with immovable intra-pedicular foramina have been artificially subluxated and pathology allowed to develop. These pathologies have reversed and cleared following adjustments and repositioning of the vertebral segments. This would indicate that much of the symptom complex is due to something other than foraminal changes.

Proprioceptive and nociceptive endings in and around the inter-vertebral articulations maintain a normal CONVERSATIONAL TONE of afferent impulses into the cord segment. This is necessary to normal function and the maintenance of all tissues at this level. Splinting a joint for immobilization causes atrophy. In a year of immobility the joint will ankylose and become functionless. Orthopedic surgeons find that broken joints heal much faster with daily movement. Immobilized joints become increasingly stiff. Sudden perversion of this normal CONVERSATIONAL TONE of sensations will cause malfunction just as a disturbance at the entrance of an auditorium will disrupt a good lecture. If the cry of FIRE is repeated a violent pandemonium can occur and hundreds may be killed in the stampede. Likewise a violent neuropathy can arise if the appropriate perverted impulse strikes a receptive host. Such a neuropathy can become a sudden fever, a prolonged gastritis with eventual ulceration or even a dramatic anaphylactic shock and death. Foraminal changes can upset this normal CONVERSATIONAL TONE easily by disturbing sensory endings and cell bodies in the dorsal root ganglion lying within the foramen. Hence the pressure on the nerve trunk is only a minor element of etiology.


LOCAL SENSORIAL CONVERSATIONAL TONE
DORSAL ROOT GANGLION
lying partly within the foramen
①Paccinian Corpuscle in cartilage plate (pressure)
②Paccinian Corpuscle in facet (pressure)
③Nociceptor in annulus fibrosis (pain)
④Nociceptor in articular capsule (pain)
⑤Golgi Tendon Organ (proprioception)
⑥Muscle Spindle (proprioception)
⑦Visceral Receptors
⑧Dermal Thermoceptors (2 types)
⑨Ruffini End Spray (proprioception)

Timing

Additional consideration of vertebral malpositioning arises from the time element in the physiological adaptation of the organism to its environment. In a slowly developing scoliosis over several years there are osseous changes at the foramina with recession of the pedicles so that in a severe scoliosis the pairs of inter-vertebral foramina have almost identical areas but different shapes. An acute subluxation which has been greatly distorted and then not properly re-positioned will slowly undergo a similar series of adaptative changes over the years and become asymptomatic. A sudden reversal or straightening of this spine, therefore, introduces a new unstable pathogenic condition. One of the major problems confronting any chiropractor is the evaluation of the relative importance of the varied aberrations of normal body mechanics. It is common knowledge among chiropractors that a gross mechanical displacement is frequently producing very few symptoms while an almost imperceptible subluxation in excellent mechanical alignment can be initiating a vast complex of serious pathological changes.

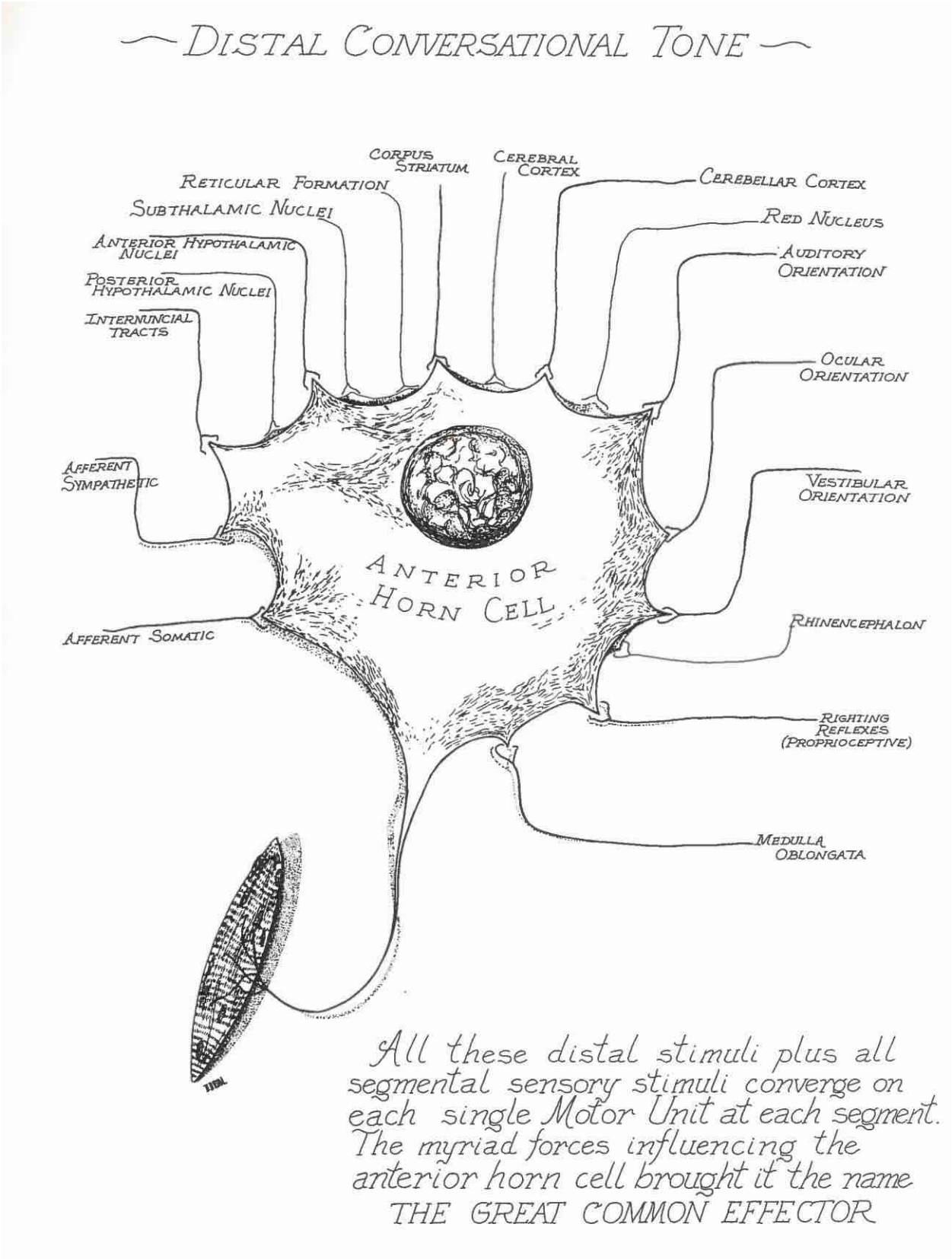
Previously in this book we detailed three classes of injury, “nerve insult”, which apply directly to three classes of subluxations:

a. a simple sprain of an inter-vertebral articulation which induces almost no neurological upset but only a rapid adaptation and uneventful recovery either “spontaneously” or with minimal care.

b. a sprain, major or minor, which shocks the sensorial CONVERSATIONAL TONE enough to initiate a widespread neuropathy. Circumstances are often such that the neuropathy becomes a vicious, self-perpetuating entity with extensive ramification to continue long after the original sprained articulation has recovered.

c. an adaptative spinal distortion which arises reflexly from the neuropathy previously initiated. This distortion may be symptom-free except for minor local symptoms or it may in turn become a full-fledged symptomatic subluxation initiating additional neuropathy to repeat this b-c, b-c circle.

The comparison and evaluation of degree of this very condition is one of the primary reasons for this entire research program.


DISTAL CONVERSATIONAL TONE
CORPUS STRIATUM
CEREBRAL CORTEX
RETICULAR FORMATION
CEREBELLAR CORTEX
SUBTHALAMIC NUCLEI
RED NUCLEUS
ANTERIOR HYPOTHALAMIC NUCLEI
AUDITORY ORIENTATION
POSTERIOR HYPOTHALAMIC NUCLEI
INTERNUNCIAL TRACTS
OCULAR ORIENTATION
AFFERENT SYMPATHETIC
VESTIBULAR ORIENTATION
ANTERIOR HORN CELL
AFFERENT SOMATIC
RHINENCEPHALON
RIGHTING REFLEXES (PROPRIOCEPTIVE)
MEDULLA OBLONGATA
All these distal stimuli plus all segmental sensory stimuli converge on each single Motor Unit at each segment. The myriad forces influencing the anterior horn cell brought it the name THE GREAT COMMON EFFECTOR

Reflexes

Viscero-somatic and somatic-visceral reflexes have been recognized for years and investigated in great detail by eminent physiologists. It has been demonstrated repeatedly and vividly that the constellation of symptoms and pathological changes is almost entirely neurogenic and extremely diffuse, often far from the initial site of injury to the nervous system. It has been shown that the severe shocks to the nervous system as done in a nerve section, novocaine blockade and even by much of the drug therapy is frequently sufficiently drastic to scatter the constellation of symptoms and induce a subsequent pathology which is at times much worse than the original problem. The potency of a light stimulus properly applied is illustrated by the classic example where 10 of 11 cases with quinine resistant malaria responded completely by the disappearance of symptoms and the disappearance of the microorganisms following the very gentle stimulation of the nervous system by withdrawing and re-injecting the cerebrospinal fluid. Hence we find that re-examination of the chiropractic approach to health and disease is quite logical. The many methods of adjusting developed through the past years have each been quite effective although there is a great variation in applicability. With the use of our new monitoring system we are finding that none of these old methods is wrong. However, with our new monitoring system we are able to perceive much more deeply the neurological processes and use the various methods to much better effect. We frequently find that a violently symptomatic subluxation should not be approached directly. Such a direct approach will frequently cause extension of the entire neuropathy even though it may abate some of the local symptoms. These are the conditions which we have previously explained as phases of "retracing". In such cases an indirect approach by successively clearing apparently minor secondary subluxations will result in sufficient overall improvement that the major problem can be approached directly with excellent results. There have been times when as many as thirty different adjustments were utilized in succession over a two hour period of time with the final summation of correction into a complete recovery pattern. Usually there are intervening rest periods so we find the same process spread over several weeks. Attempts at a complete recovery in one day are almost always thoroughly frustrating in that after a certain point has been reached anything further seems to aggravate the whole problem of the neuropathy. A few days later the same approach will bring gratifying results. Therefore, it is imperative that any chiropractor trying to use this method be patient and not try to revolutionize his entire method of practice immediately. This monitoring system should be used for special problem cases at first with the idea that it will not tell us what or how to adjust but will give us an excellent indication of what not to adjust and when to quit.

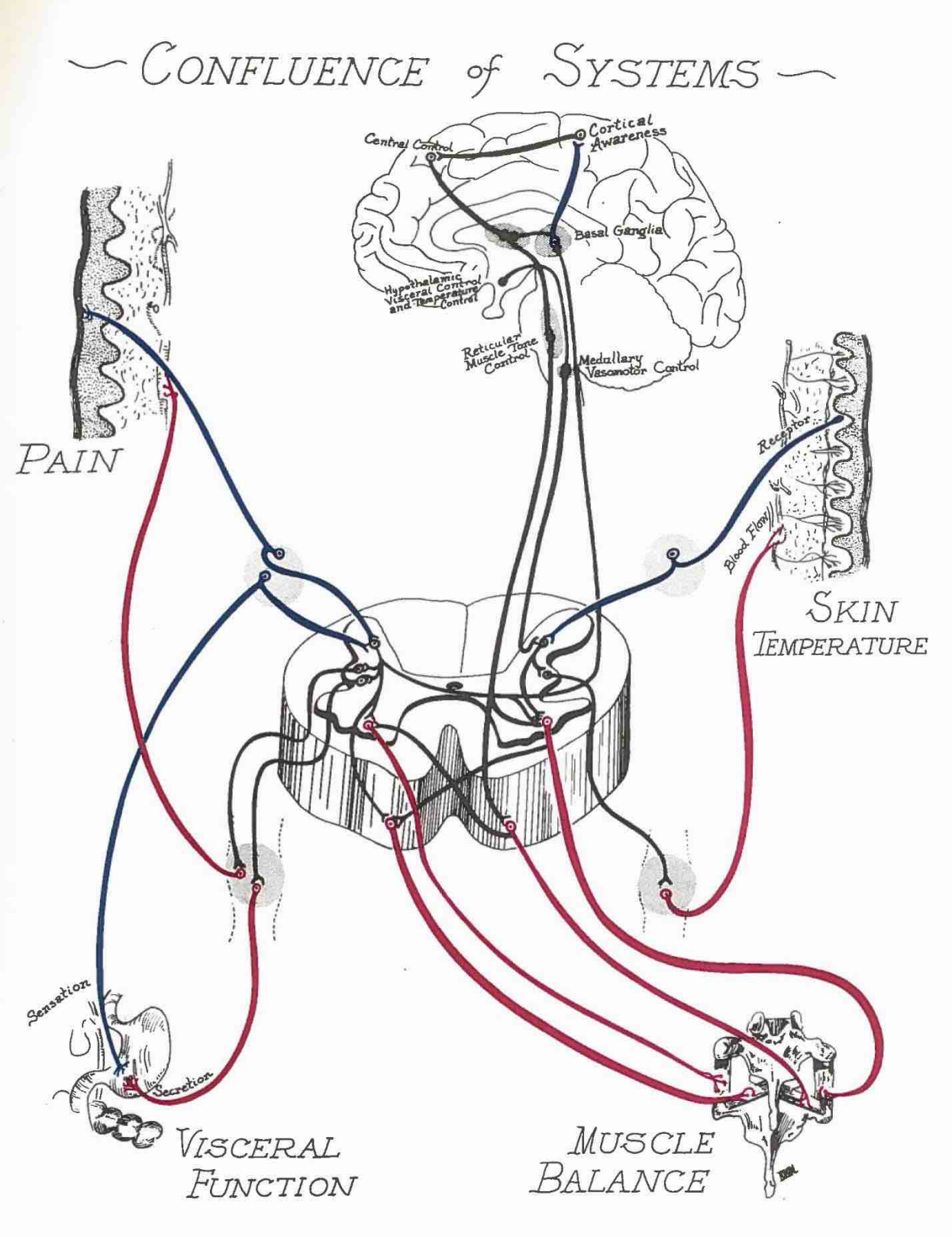
Since a neuropathy is often a self-perpetuating entity of abnormal neurological events it reminds one of the Gordian Knot of Legend. This story tells of King Gordius tying a complex knot with no visible end as a challenge with a magnificent reward. To obtain an end for unraveling the puzzle the victorious youth cut through the knot with his sword to become the world conqueror,

Alexander the Great. Frustrating cases tempt us to "cut through the knot" to find a starting point. Chiropractors are fortunate in that the aberration of physiology is still definitely related to body mechanics although the neuropathy may continue long after the original subluxation has subsided and been forgotten. Even though the entire process is quite obscure there is usually a reflex side effect in the form of some disturbance in body mechanics. Management of these inter-related effects fortunately gives us an access point into this vicious circle of self perpetuating pathological reflexes. Thus diligently applied chiropractic care, even though directed to a minor facet of the entire problem, is entirely capable of appreciably changing the neuropathy if intelligently pursued. Thus we find that instead of having to cut the rope in the Gordian knot there is always a loose end available to us. The fascinating possibilities of chiropractic when aided by the present monitoring system of vasomotor response is that we have a method of guiding an effective approach from the periphery of the process right to the heart of the neuropathy.

Another facet of the timing is based upon the relative stability or instability of various segments of the total pathological process. A recent single scoliosis based entirely upon a short leg can obviously he approached directly. When the same condition has progressed into a triple scoliosis we find that a direct approach will usually immediately help the lumbar spine but will cause new symptoms to arise in the compensatory scoliosis. As the last scoliosis is the least stable it will frequently be fluctuating into and away from symptom production. These unstable processes are usually directly and easily approachable. Therefore, during the entire management of the chronic scoliosis we must consider the various decompensations and the introduction of new instabilities as a temporary factor. This requires careful guidance and is very frustrating. The more thoroughly we can understand the relationship of these various factors, the more successful the total management. The constellation of dysfunctions and symptoms leading to organic pathologies have even greater ramifications and are much more difficult to evaluate. This is precisely how the vasomotor monitoring system is of immense value.

Quality of the Nerve Impulse

Long ago the gastrocnemius of a young frog was transplanted into the foreleg and given time for nerve regeneration. When the brachial plexus was then stimulated the gastrocnemius did not respond but when the lumbar plexus was stimulated the gastrocnemius contracted in the foreleg concurrent with the hindlegs. In a later experiment a band of skin was raised from around the torso of a young frog and was slipped to rotate 180 degrees. The nerve pathways were not disturbed except to trade peripheral endings. Tickling the frog's back later caused the frog to scratch its stomach while scratching the stomach prompted back scratching. Hence the QUALITY of the nerve impulse — nerve imagery or "flavor" of the tissue — supercedes the mandate of the pathway. Even though instrumentation is not sufficiently refined to delineate all this neural mechanism we are certain that QUALITY of the nerve impulse is the primary element of control of structural and functional integrity. Aberration of this control is the fundamental element of the neuropathic process. It has been quite adequately demonstrated that induction of subluxations in experimental animals will produce symptoms in varying complex constellations of neuropathies. It is also true that the induced pathology will reflexly induce other variations in spinal mechanics. This definite neurological linkage between the numerous physiological systems of the body including those of visceral function and neuromuscular skeletal postural control is well established. The elaborate detailing of this inter-relationship is the object of many research projects. We are apparently quite fortunate at this time to have a new indicator which seems to give us a much deeper insight into neural integrity than ever before possible. With that we invite your participation in a much more rapid advance in the understanding of neurophysiology and of chiropractic.


CONFLUENCE of SYSTEMS
Central Control
Cortical Awareness
Basal Ganglia
Hypothalamic Visceral Control and Temperature Control
Reticular Muscle Tone Control
Medullary Vasomotor Control
PAIN
Receptor
Blood Flow
SKIN TEMPERATURE
Sensation
Secretion
VISCERAL FUNCTION
MUSCLE BALANCE

Conclusion

We have attempted to introduce the physiological background adequately to understand our conclusions from this research project. Fortunately the technical breakthrough by closely monitoring two variables has in fact given us results previously denied as possible by physicists and physiologists. We are quite aware that these areas will be challenged and will require us to present much more supporting data. This is planned in the form of successive appendices of which several can be added to this expanding binder. Some of these data will be from your field reports.

As with any new scientific advance there will be challenges to the authority for conclusions. The bibliography lists much supporting evidence but we cannot progress forever on well-worn highways. Trail blazing must be done in several areas. For this we accept full responsibility. Undoubtedly many refinements will be made over the years but we are proud of the status of our present endeavor.

To you who are now joining us in this investigation please do not expect a bed of roses with no thorns. This work does become frustrating at times as did Edison's work with lamp filaments. Our enthusiasm and joy in advancing the sciences of neurophysiology and of chiropractic is making the effort justifiable. You too will find a great satisfaction with this work.

In summary this is a presentation of the most accurate and by far the most penetrating insight into the total individual neural integrity. We are thus able to explain the "miraculous" recovery which at times follows minimal adjusting in an area remote from the symptom center. We now are able to see the collapse of neural integrity immediately preceding the occasional relapse following a normal adjustment. As such we can now compare all prior evaluation of patient management with myriad diagnostic procedures to stumbling in the twilight. The searchlight now available in vasomotor monitoring is a great leap forward. We welcome you into this trailblazing effort to help in a united effort of refinement. You will find great satisfaction in your accomplishments.

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The lead paragraph in italics that opens the first section of this book, "The Science of Chiropractic", was contributed by the Founder of Chiropractic, D. D. Palmer. It was written at the turn of the century, and is one of the many contributions he has made to science.

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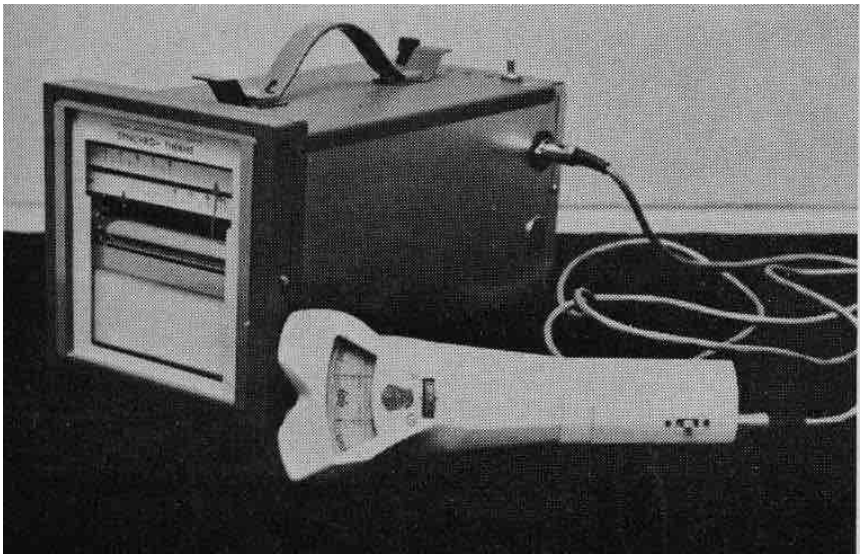
Appendix



The Synchro-Therme

The first Synchro-Therme seminar to be held for the field was presented to the Chiropractors of British Columbia on Feb. 27 and 28, 1965, at Vancouver. Seventy-nine Chiropractors from the western Provinces and Washington were in attendance. "This 'first' for CMCC has been long awaited, and I am delighted it was so well received," expressed the views of the registrants. Pictured above, front row, left to right, faculty of CMCC: E.F. Shrubb, D.C., R.J. Watkins, D.C., A.R. Petersen, D.C. and H.M. Himes, D.C. A subsequent seminar was attended by over fifty Chiropractors two weeks later at Olympia, Washington. (*Digest of Chiropractic Economics*, May/June 1965)

Appendix I

Excerpts from a 1980 Palmer Beacon interview with Dr. Andy Petersen, inventor of the Synchro-Therme and author of the main text of Segmental Neuropathy.

Dr. Andy Petersen Talks

The Beacon, July-August 1980

(Andrew Runge Petersen, PSC ’47)

Petersen: In 1953 I came out of practicing in the field and got heavily involved in instrumentation research. I started Blackhawk Instruments, the first company to ever compete with Palmer and its NCM monopoly. B.J. would’ve killed anyone else doing what I did. I started to look at the suppositions under which the NCM is used and at the instrument itself. I didn’t even know the significance of what I had discovered for a year. But when we discovered the vertical heat differences and had established a controversy between B.J.’s ‘hot nerve’ and alteration of blood flow rate to the skin, we didn’t believe it. We were good Palmer chiropractors. We believed in the hot nerve. We kept digging till, in 1958 we had enough to present to B.J. – the obsolescence of the NCM, in that it was unable to monitor vasodilatative changes vertically as opposed to horizontal thus the vertical changes did not register, and to introduce the reality of the *cold* areas of sympathetic aberration in neuropathy as opposed to the ridiculous ‘hot nerve’ concept. Anyhow, there I was lecturing on and on to B.J., Herb Hender, Ralph Evans, and Otto Schermbeck. When I’m through B.J. looks at Otto, who was head of Research and Instrumentation and who has been pondering my material for days, and B.J. asks, ‘Well, is he right?’ Otto said somberly, ‘Yes, B.J., he is.’ B.J. thinks for a minute then says, ‘Well, as long as I’m alive it stays hot.’ I looked around the room while B.J. walks out, wondering what just happened. Everybody is looking at me and shaking their heads. ‘Andy, you lost,’ they said. And that’s all there was to it. No matter what the reality of the situation dictated, at B.J.’s word another reality was dictated.

The research data I was putting together in those years is what put me opposite the fence to B.J. and chiropractic. Around 1934 Speransky was doing profound research in Russia. By the 1940s he was the biggest thing around in neurophysiology. ‘Segmental neuropathy’ is Speransky’s term. Speransky did the famous experiment with the administration of toxic doses of cyanide to a dog under deep anesthesia. Because the dog’s nervous system was unresponsive to the cyanide, no reaction occurred with it and within hours it was secreted from the salivary glands, and the dog awoke unharmed. Speransky found, however, that if the animal awoke from anesthesia before all the toxin was secreted, the animal died within seconds. People today still think the body takes weeks to respond on an immunological level to foreign entities. Speransky showed this to be totally erroneous. The body responds virtually immediately. He carefully surgically separated all of a rabbit’s ear from the body except by one sensory nerve fiber. He then introduced a foreign culture to an abrasion on the distal portion of the ear then promptly severed the one sensory nerve.

Speransky did blood and tissue cultures on the rabbit and discovered that even a momentary signal to the CNS alerting it to foreign invasion was enough to make an immediate response in the immunological systems. How is that for chiropractic advertisement?

In the mid 1940s Palmer campus was alive with the idea that Speransky had provided evidence to show the subluxation was real. Chiropractic had a scientific basis, and if Speransky had known of the subluxation he could have plugged it into his equation and completed his knowledge of neurofunction. But when I read Speransky, I found people must not have been paying attention. Speransky verified conclusions of my own concerning the unlikely existence of 'subluxation,' the static concept of 'stepping on a hose.' As I suspected, Speransky's extrapolations leave no room for such nonsense. Not that there isn't a chiropractic, not that there isn't a rationale for looking first to the nervous system in order to combat disease, … We don't fully understand the incredible sensitivity and dynamism of the nervous system… Speransky points out that the neuropathy, once established, is not a biomechanic stress but is an aberrant process of nerve function that is independent of its first cause. ... The neuropathy, Speransky proves, becomes a separate, abnormal intelligence. It moves throughout the system. It expands. It assumes a functional process of disease all its own. Can you see why chiropractors who play with their miniaturized packages of cracking bones are so hateful to me? Without sensitive controls to monitor the responses of the nervous system to your work, you are playing with fire in that every adjustment you make can very possibly instigate another neuropathy into a system that is already under neuropathic stress. . . .

Beacon: What do you do that is different from orthodox chiropractic?

Petersen: "Orthodox chiropractic is the process of finding and removing encroachments on the peripheral nerves as they exit from the spine. Orthodoxy has misinterpreted these subluxations as the cause of disease. I know that the mechanism is a neuropathic mechanism and that it is far more complex than a trophic or a biomechanic explanation by themselves, although it involves both. The neuropathy can be thought of as an untuned string on a harp, so that all tones, or signals, from that one string cause a disruption in the music of the entire instrument. Speransky has shown that the neuropathy is the neuron(s) in the irritated state, and involves a cortical component. In other words, a neuropathy can be effectively extinguished through hypnosis. Furthermore, and this is why I am so antagonistic to contemporary chiropractic, Speransky showed that the neuropathic process can retreat into the nervous system and later surface in a more complex and more difficult to combat disease symptomatology profile. I have tried to make the people who move the chiropractic profession understand that by attacking the central nervous system by manual manipulation of the spine, without advanced instruments to monitor the reaction of the neuropathy, you run the risk of greatly endangering the public."

Beacon: How does one monitor the neuropathic responses?

Petersen: "I use the instruments I invented. I used the Synchrotherm before I was taken to court to be told it was too advanced for me. Now I know to keep my mouth shut about my instruments. But what happened with the Synchrotherm was OK – I use a more sensitive instrumentation now. I use liquid crystals. …

When I work on a patient to check them out vasomotor-wise, I lay them prone with the (liquid crystal) strips on their back, and I intrude into the nervous system until I have an even skin temperature pattern. It may take hours or years, but I know that the neuropathy is extinguished. Others might think they are doing the same thing I am, but they're not: Their instrumentation is dangerously crude, it cannot tell them what they need to know; and their static conception of the nervous system and the human body is so far afield it's beyond the capability of your article to explain.

Beacon: What do you mean when you say "intrude " on the nervous system?

Petersen: "I perform an action to cause a change in the afferent system. To extinguish a neuropathy you have to attack it on the same level it began – on the level of neurofunction. The body knows how its own spine is to be configured. A spine becomes biomechanically stressed after a neuropathic process distorts the body's perception of itself. This is why all chiropractic techniques work to some degree or another, *sometimes* they wipe out the neuropathy. But because they are intruding in the dark, so to speak, they are getting far less good results than they claim, and they are oftentimes causing dangerous complexity in the system.

Beacon: What techniques do you intrude with?

Petersen: Toggle and Logan Basic, primarily. Toggle is powerful by nature of the mechanism of the adjustment itself, sharp and fast, directed at the brain stem. And I intrude with Logan because putting your thumb where you do, you command the nervous system's entire conscious-autonomic attention. I shock my lecture students when I make them understand that an intrusion does not remove osseous pressure on a nerve, or the traction of meninges on the cord. By intruding you are hoping to wipe the slate clean in the sense of neurodisfunction. And hope is all your adjustment will ever amount to unless you have a means of watching the nervous system on a functional basis. If you can't monitor moment to moment changes as you work, chiropractic is a dangerous roulette game with the nervous system. That's why B.J. knew long ago that you can push people down some stairs, or knock them in the rear with a shovel and get yourself a sizeable percentage of check-outs. My segmental neuropathy system of chiropractic is more complex than others. But it's real. If my kids are worried about money when they start a practice, they accept less patients and charge more for their time. That way they can do what I asked of them in the beginning – "Think."

Beacon: What's ahead for you?

Petersen: Computerization. Chrononeurology. Keeping track of intrinsic and extrinsic factors that play a role in health so that we can predict the point in time when our intrusion will cause the

most change to our patient. To understand what I just told you, to let you know how possible it is, I've got to tell you about Prof. Franz Halberg. Halberg is the first word, the only word, in studying the role of time in relation to disease. He coined the term Chronobiology, which in his words is, "defining health in terms of predictable, rhythmic biologic variations of physiologic function in many frequency ranges with interval time relations and relations to external synchronizers, modulators, and influencers."

Halberg is working on huge NIH grants. He links a patient to a computer which scans and records every system in your body you can think of, so Halberg can then predict the proper minute to administer a drug. I know Halberg personally. My kids go up and work with him in return for being hooked to one of his computers, and I want to do the same thing with chiropractic. I want to know the moment of a patient's biorhythmic pattern wherein he will respond optimally to my intrusion.

Chronobiology gives orthodox medicine a devastating blow. Halberg's results are staggering and you and I, as chiropractors, are not immune. Look, a segment of the medical profession has long known of the benefits of crude manipulation. Yet the common mind of that profession is unconvinced and is still looking for answers. Chronobiology is the stone they've last overturned. We should be hip-deep in our own chrononeurology. For me that's what lies ahead.

Beacon: What does Halberg mean by "external modulators, synchronizers, and influencers?"

Petersen: Everything outside your body which causes change in you. (He laughs) You name it, Halberg is tracing cycles of it with his computers. Cosmic rays, pollution indexes, everything he can record chronologic data on makes his next point-time calculation all the more accurate. Halberg monitored cancer in rats: Chronotherapy for cancer is now documented in three experiments with rodent models: leukemia, immunocarcinoma, and mamillary carcinoma. An administration schedule replacing a homeostatic equal-dose schedule can double the cure rate, in much less toxic dose ranges of Platinum and Adriomyosin, which killed 25% of nontumorous controls. The scheduled administration led to 25% up to 65% complete remission in the study group depending on treatment timing.

As far as chiropractic and all other health arts are concerned, research findings like this nails the coffin lid shut on dogmatism. Chiropractors who perceive the spine as a static, fixed element will be made obsolete as this research expands. Do you want to keep believing the world has four corners? The human body and its nervous system are too complex for the games we are playing now. Do you want people to laugh at how stupid you were after you die? How, then, do we deal with the future? Chiropractic has been somewhat successful as a healing art because at one time it was a great step forward. But we haven't done anything significant since the day D.D. adjusted Harvey Lillard. …

Beacon: Tell about losing the Synchrotherm in court.

Petersen: The FDA brought me up on charges that I claimed the Synchrotherm measured skin temperature which I could relate to health. I made my preparations for the case, assembling and paraphrasing my work, making calls to various organizations and colleges in the profession asking for help in the case. I told them it was more than just the Synchrotherm on the line, and that they'd better help me hustle for the sake of the profession. Well, I got a staggering number of promises. But as my day in court drew close, one by one I could feel my old friends losing their nerve. I went to court by myself – no help from ICA or Palmer College or anyone else.

I told the court about the Synchrotherm's development and related it to Speransky and segmental neuropathy; I gave them everything I could to show that segmental neuropathy worked. The final day I spent in the judge's chambers with the judge and the then Director of FDA. The FDA guy was cursing chiropractic to hell. He said he thought chiropractors were a menace to the AMA not because we were a scientific disease but because we were a social disease. He yelled at me, *"You chiropractors are worse than niggers!"* And that's not my semantics. That's a direct quote. The judge had to cut the guy off and get him out. He said afterward, "If I were you, I'd sue him for what he said. You have grounds. But I can't let that have any bearing on this case." And the decision went against me. I taped that discussion in the chambers with the FDA guy with a recorder in a briefcase, and when he found out, at first he wanted to kill me, then he begged and begged me to destroy it.

Beacon: Did you?

Petersen: No way. The judge decided that because the medical profession recognized the correlation between sympathetic vasomotor control and the disease state, and because the Synchrotherm measured skin temperature so effectively, the Synchrotherm was a medical instrument and ruled too sophisticated for chiropractic use. That was 1968. And unless you're an M.D., even today you'll not be able to get your hands on a Synchrotherm.

Appendix II

A letter from Dr. Petersen on CMCC stationery distributed to the profession describing the evolution of his relationship with Dr. Himes.

NEWSLETTER - Synchro-Therme

March,1966

A.R. Petersen, D.C.

The Council on Education of the American Chiropractic Association was privileged to hear an address by Dr. H.M. Himes at their mid-year meeting held in Des Moines, Iowa, in January 1966.

In this address, Dr. Himes, speaking on behalf of the Board of Directors of our College, extended the invitation (for the second time) to all Colleges to join CMCC in its programme of instrumentation, research and development.

If it were not for the fact that we personally feel that this speech represented our best thoughts and deserved to be brought out from behind-the-scenes, you would not otherwise have the chance to read it. This is not the only reason that this speech is reprinted here. I have a personal interest in that moment when this speech was delivered. For you to appreciate my feelings on this subject I must tell you some of the background events that occurred over the past fifteen years which lead up to that moment.

There was a time, many years ago, when Dr. Himes and I stood on opposite sides of many philosophical arguments over what I considered to be Palmer "Dogma." To test the point of these arguments a two-channel temperature recorder was built in 1950 especially constructed to monitor that thermal phenomenon which had been theorized to be the physical expression of an increased resistance to the flow of nerve energy. When this device was completed, Dr. Himes was among the first to view the graphic reproduction of the phenomenon.

From that time until much later in 1959 I spent all of my efforts, constructive as well as destructive, in private "in-fighting" with B.J. over the issue of the worthlessness of the Neurocalometer, its use, and the theories of its interpretation. During this time there were quieter moments when I sat and discussed the various weaknesses and strengths of B.J.'s peculiar personality with Dr. Himes. Again, Dr. Himes was the first to break through my blind "hate and discontent" to show me the miracle of this man. It has always been a pleasure to listen to the measured reasoning of Dr. Himes, who, even though he worked in what I considered the "enemy camp," gave sage advice to friend and foe alike.

In 1959 Dr. Himes was among the first to view the final and conclusive evidence that the Neurocalometer was scientifically inadequate. Proof of this fact was obtained from special test equipment designed to test the accuracy of the Neurocalometer in detecting thermal change under controlled conditions.

From that moment on, I recall two men who had the courage of their convictions that this data having now established the fact, were willing to STAND UP AND BE COUNTED on my side. One of these men was Mr. Otto Schniernbeck, head of the Neurocalometer Department of PSC. The other man was Dr. Herbert M. Himes.

Following this event Dr. Himes appointed to initiate a series of private conferences between the faculty and myself which were to be conducted along constructive lines. Just prior to this appointment, the first attempt at such a conference under Dean Hender, ended abruptly within inches of physical violence between a faculty man who taught NCM and myself. Dr. Himes was the first to successfully complete a constructive series of conferences on these matters.
I would like to state here that a great many wonderful advancements would have come out of Palmer at that time if Fate had not stepped in and changed the course of events with B.J.'s death.
Shortly thereafter Dr. Himes and I departed that scene only to meet once again under very different circumstances in March of 1964. It was then that I received the greatest compliment anyone can receive for his ideas. It was at that time Dr. Himes staked his health and future well-being on the proposition that this new concept, system of instrumentation, and particular method of application, was more useful than any of the older ways of practice.

All of this brings us to the point of his speech. By giving you some of the background which preceded that moment, I hope to help you share with me some of the feelings I have regarding this man and his Innate courage to STAND UP AND BE COUNTED.

A.R. Petersen, D.C.

Appendix III

Excerpts from a 1980 Palmer Beacon interview Dr. H. M. Himes, Dean of CMCC at the time of the Synchro-Therme research project. Dr. Himes convinced the CMCC board to hire Dr. Petersen, manufacture the Synchro-Therme and to publish Segmental Neuropathy. Dr. Himes was a former chairman of Palmer's Technique Department and teaching clinics, and a contributor to the Segmental Neuropathy text.

Interview with H.M. Himes

The Beacon, March-April 1980

(Herbert Marshall Himes, PSC 1931)

Chiropractic Technique

Himes: The pendulum, and rightfully so, has swung from these millimeter measurements of spinal segments, as you see in Grostic, Keck, and Blair x-ray analysis to a more sensible attitude of neurologic dysfunction. After being an HIO man myself for many years, I know today that such minute analysis is unnecessary. I say that in total honesty – Let me put it another way: B.J. said of subluxation, "An invasive force can enter the body at any point, and carry with it the potential for the production or the reduction of vertebral subluxation." Now, that's dogma. Let me say it another way: "*A specific stress insult can enter the body at any point and carries with it the potential for the expansion or the extinguishment of the neuropathic process."* There is a difference. B.J. believed that you could hit a person in the butt with a shovel, and the "shock wave," in some instances, would reset the Atlas and give you a reduction. Today we know that is dogma! We know striking the patient doesn't necessarily change the Atlas, but it does change the neurology. Now, to say that this strike can potentially expand or extinguish the neuropathic process is true. And whether or not a given technique can accomplish this extinguishment is what makes it good or useless, depending on the time, space and arrangement they are used on the patient. Specificity of adjustment is a quality that lies within the patient, not within the system I practice. We must think in terms of, "Where can I intrude into this nervous system to extinguish the neuropathic process", otherwise some of your patients will remain unresponsive to your treatment. To be effective I need to locate that point of intrusion that will end the neuropathic process. We need a lot of work in that area. The importance of specificity here D.D. brought out, in that all segments of the spine are specific, and in some instances, articulations other than spinal. You can, by accident, sometimes extinguish neuropathic processes. Back in my day we had an instructor who was a terrible arthritic, with no relief until one night he piled his car into a culvert. We brought him back to the clinic and

found no measurable nerve interference on the "caligraph." His readings were gone from the crash and he got well. Demolished his car. Pile your car into a culvert and get adjusted.

"You see, we are dealing with something of enormous complexity. The nervous system not only fades into nebulous areas of computerization, but it also borders on what used to be called, "spiritual factors." Science today is seeing the importance of examining these areas of spiritualism. In my day such creative thinking -- meditation, self-hypnosis, bio-feedback – all were considered Occultism. Our knowledge of them currently is crude in comparison to what we will learn, say, in the next twenty-five years.

The Neuropathy

Himes: The neuropathy is an aberrant nervous process and goes beyond chiropractic philosophy. Read "Spencer's Definition of Life." He observes that life is more than just a quality of internal relations adjusting to external reactions – there is a prophetic, an anticipatory judgment, on the part of the body long before a pathology is developed. Because of the enormous complication of living factors it is impossible for me to speak of the neuropathic process in the detail you would like me to. But a neuropathy can be defined briefly as any derangement of a nerve or nerve system where it is not carrying out the function for which it is designed. D.D. Palmer said on page 57 of his book: "In disease, impulses are not impeded, stopped, or cut off. They are modified."

"Now, you look at modern research. You cannot command the attention of a researcher today with a word like "mental impulse." Whereas, if you ask about the *qualitative factor* of nerve activity he'll know what you're talking about. Think of the qualitative factor like this: You pick up the telephone and listen for your dial tone – good, you say, circuits working; and that is your quantitative factor. But as soon as that base tone is altered by someone talking to you, sending a message by changing the tone – that is your *qualitative factor.*

If you ask researchers today about this factor they'll have to admit they don't know. We've only investigated it the last fifteen years. But look back to D.D. – the only difference between D.D. of 1910 and research today is a semantic difference. This is why I criticize Price and others. They've been keeping their foot on the hose too long, explaining chiropractic principle with obsolete illustrations which are great insofar as relating preliminary ideas to lay patients. The same sort of thing was carried on in B.J.'s day. Nerve interference was not cold – it was hot. And he insisted on it so long as he was alive. But we know today that it's just the opposite. Dermatomal interference causes a cold spot, and this lack of vasodilatative responsiveness is what we're looking at. A Japanese fellow with equipment that we as a profession won't pay for, has proven that interference is *cold*. (See Appendix VIII for excerpts from Ishikawa's research; SWDC) In 100% of pleurisy cases he tested there is cold at corresponding segmental levels of nerve distribution. In other words, our old Meric system is anatomically accurate."

The Chiropractic Future

Himes: "So, all we have to do – and think about *this* job – is take Stephenson's, and all the other chiropractic text-books that have outdated, outmoded means of communication, and convert them to modern terminology. I have no qualm dropping the term "mental impulse" for the "qualitative factor," because the scientific and educational communities will believe me. So, the ACA-CCE say, "Get rid of our dogma!"; but if we're not careful we'll throw out the baby with the bathwater. Our archaic terminology translated into current nomenclature is no longer dogma. And that's the crux of chiropractic.

"And what should we be researching? Neurology. And the effect our work on the spinal joint has on neurology.

"As a matter of fact – and this is a funny story – when I was doing work at CMCC I was organizing graduate chiropractors from five colleges to do research on different patients. Talk about impossible; they were completely at war. There was one problem case in which we just could not clear out the interference of this patient, and I asked Henry Gillette to come up and give us his analysis. Well, Henry started out as only Henry can, palpating clear up on top of the scalp and working his way all over the place. Then Henry looked at me and said, "Why, I'd adjust the second toe on this patient's right foot." I said, "Oh, Henry, for God's sake, be reasonable about this." "That's what I find!" All right, then, do your thing on that second toe. And when we laid the kid down and did our instrument analysis on him there was no interference we could find. Now, how many second toes are you going to adjust? Not very many, let me guarantee you. But all the rest of us had done nothing for this patient at the spinal joint articulation.

"You see, we don't have the key yet. I couldn't tell you today, looking at the placement of cold spots on a reading by a two-channel instrument such as the *synchrotherm*, where I would want to begin adjusting. We don't *have* the research. Nothing. Just argument. To correct a given neuropathy I may need to do a toggle along with a diversified move on a thoracic, and maybe a Logan Basic contact, too. If the neuropathy was extinguished by these then all of these adjustments were specific. Now you try and tell that to a Grostic man or someone else, and they'll tell you your line of drive was wrong, or your x-ray analysis was incorrect. No research, just argument. Specificity is a moment to moment quality lying within the nervous system of the patient.

Now I wouldn't have said this ten years ago, but with the proper method of analysis I must also be qualified in the three methods of adjusting: cleavage, which is toggle or a thrust; leverage, which are the rolls; and pressure, which is Logan or other comparable technique. If you are expert in each of these I guarantee you'll have more patients than you can handle.

Beacon: In order to apply these techniques, how do we find the neuropathy?

Himes: Well, first of all we need more advanced instruments. But even if you use your NCM or Thermeter to look for cold spots, and then adjust into the warm side, you'll begin to improve your

record of success. Come in on the warm side *always* . . . I said "always," that is not true. You may find a patient not responding to adjusting on the warm side and realize you have an exception. Because of the complexity of the system we are dealing with, "Always" should not be part of our vocabulary.

"In every constellation of disease there is the neuropathic element, which chiropractors alone are concerned with. If we can remove this factor, the disease constellation will no longer be complete, this is what makes us great. Visualized in this perspective the idea is so simple. This is why we are so stupid to have so many fractionalizations from one philosophy called chiropractic.

Appendix IV

Supplemental material written by Dr. R.J. Watkins, CMCC's Dean of Clinics and Graduate Studies at the time of the Synchro-Therme project. Watkins authored the "Segmental Neuropathy of Kinesiology" portion of the text. The below was distributed at early seminars.

NEUROLOGY OF SEGMENTAL CONTROL: ABERRATIONS & RAMIFICATIONS

R.J. Watkins, D.C., PhC, FICC, DACBR

(Lincoln Chiropractic College, 1942)

Body heat is generated by fuel combustion in the skeletal muscles and in the splanchnic viscera, particularly the liver which is the hottest spot in the body. This heat is gradually dissipated to the environment in order to maintain optimum body temperature. For the moment we shall by-pass the general body temperature control centers in the hypothalamus and in the medulla. Circulation of blood through the cutaneous capillary bed as a heat regulator is largely controlled by the vaso-constrictors to the peripheral arterioles. This is generally assumed to be under the control of the cell bodies lying in the paravertebral sympathetic ganglia. This type of vaso-constrictor control usually covers one to four segments per unit. There is an overlap of these fields, largely because this is a part of a generalized temperature control which is not specifically segmental. The sensory fibers picking up the temperature changes of the skin have their cell bodies lying in the dorsal ganglia from which the impulses are transmitted into the posterior horn of the cord. The connecting neurons then carry the impulses to the lateral horn preganglionic neuron which in turn synapse in the sympathetic ganglia. This forms a segmental arc for the vasoconstrictors. It had been noted some forty years ago that section of the posterior nerve root followed by a mechanical stimulus of the distal portion would result in vaso-dilation over that area of nerve distribution. This could not be construed to be through any action of the sympathetic ganglia because that portion had been isolated prior to the stimulus. Consequently it has been postulated in many different authoritative texts that vaso-dilator efferent fibers are going out beyond the dorsal root ganglia thru the sensory distribution. Some authorities have considered these to be antidromic reflexes which are reactions within various collaterals of a single neuron. Other authorities have postulated additional vasodilator cells lying in the dorsal horn which are independently sending out efferent vasodilator fibers. Regardless of the mechanism, we are finding consistently in our research that not only is the vasodilator effect closely segmental but that we even find independent action of two or more very narrow, well defined segments of vasomotor control within one vertemere.

In order to demonstrate these actions we have a drawing with the "Vasodilation" section of SEGMENTAL NEUROPATHY illustrating three segments of the spinal cord with three segments of skin complete with thermo receptors and with vasodilator fibers. In the seminar, this picture is animated to illustrate the flow of heat from the hotter thermal core of the body through

the skin to radiate into the external environment. This is accomplished by the blood flow through the skin. All the sensory impulses arising from this dermal segment are following their efferent course through the dorsal root ganglia and into the posterior horn of the cord. Central recognition of these impulses is carried cephalad through the lateral spinothalamic tract to the thalamus and to the hypothalamus. The normal antidromic reflex, with the afferent flow from the thermo receptors in the skin to the cord and the necessary efferent responses comprise this segmental action. The exact neurological pathway used in each case is not critical at this time, since we have demonstrated the very close segmental demarcation.

One reason for delineating the mechanism of this segmental vasomotor control is to illustrate the interlace in the common pathways of this cutaneous vasomotor control with other functions of this same segment such as neuro-muscular balance, visceral control and various adaptations to painful stimuli. The visceral control likewise employs a segmental arc, comprising a sensory neuron with synapses at the lateral horn to secretory, vasomotor and motor fibers, plus the post ganglionic fiber which completes this arc. These pathways are not totally isolated but also communicate with less frequently utilized synapses to interconnect the somatic and visceral systems in a shunting mechanism whenever necessary. Thus we have a factual anatomical basis for viscerosomatic and somatic-visceral reflexes. We also have a good anatomical basis for intra-relationship between the segmental vasomotor control, neuromuscular control, and visceral control.

In order to more completely comprehend the significance of the segmental vasomotor control we have an additional animated drawing which illustrates the inter-relationship of adjacent segmental control through an internuncial neuron pool as illustrated by the gold rings. Thus there is close inter-relationship between adjacent segments of vasomotor control. Once this is understood, we add the inter-relationship of the adjacent sides of the spinal cord and their distribution. This is very dramatically illustrated with types of nervous eczema where the area of skin rash on one side of the body has a symmetrically matched area on the opposite side.

Nerve pathways involved with the symmetrical involvement of the eczema or the preceding vasomotor aberration, interconnection of circles integrating the internuncial pools on both sides of the spinal cord. This is the normal physiological response that we expect and which we try to restore from a position of dysfunction. Introducing a subluxation in one segment can cause a definite nerve interference or aberration of the normal physiological reflex. In such a case, the antidromic reflex is affected long before any subsequent structural changes take place. This is a stage where, due to the malfunction of the segmental vasomotor control, we can chill the skin temporarily, and then find a lag in return of the usual blood flow through the skin in the normal heat transfer. This normal segmental reflex is now in a state of malfunction, affecting first the single local unilateral segment as an acute condition which is usually quite readily corrected. If this persists for any length of time, it frequently spreads to affect the opposite side of the spinal cord. This spread to adjacent segments of vasomotor dysfunction is located with the Synchro-

Therme. We have clinical evidence of functional collapse of this vasomotor control occasionally involving the entire thoracic and lumbar spine.

This massive loss of control, (vasodilation failure) indicates a chronic process which is well ingrained in the nervous system to form pathological reflexes of great stability. This presents an entirely different problem of normalization from that of the single acute involvement.

One interesting facet of this information is that we have three distinct types of spinal distortion:

a) A simple sprain with only minimum neurological damage. This is usually a temporary unilateral involvement and usually will clear quite rapidly with minimal care.

b) A more serious sprain which involves considerable neurological damage –which spreads beyond the localized segment and initiates a wide-spread neuropathy.

c) An adaptative distortion caused by this preceding neuropathy as a reflex subluxation. This may be symptom free or it may in turn initiate further neuropathies and form a much more extensive vicious circle of neurological dysfunction.

We have labeled the total normal sensory input of a segment from its thousands of sensory endings acting as monitors, THE NORMAL SENSORIAL CONVERSATIONAL TONE.

Since the neuromuscular, visceral and skin thermal control are mediated through the same segment, any aberration in the Normal Sensorial Conversational Tone will be reflected in all these systems. Hence an aberration in Spinal Kinesiology may be a pathogenic subluxation or may be a reflex symptom distant from the prime neuropathy. Here enters the art of interpretation of the scientific findings of the Synchro-Therme. Further to the clinical significance of Segmental Neuropathy and the kinesiology aberrations are the considerations of neurological ramifications.

RAMIFICATIONS OF A NEUROPATHY

Hematopoiesis has periodically been demonstrated to be under autonomic nerve control since Reitler in 1924. 5 minutes of Faradic sympathetic stimulus will consistently elevate both RBC and Hgbn 20% or more.

Leukocytosis can be caused by intermittent ocular pressure until the WBC reaches 20,000. Nearly total leukopenia with WBC near zero follows 10cc injection of 20% peptone while a denervated leg in the same animal shows practically no change in WBC. Capillary permeability and peripheral drift of leukocytes have both been shown to be under autonomic nerve regulation. All these seldom-mentioned neurological functions are discussed by Kuntz (Autonomic Nervous System) and others.

The Control of Immunogenesis by the Nervous System is the title of a book by Gordienko with 21 chapters delineating many hundreds of experiments to unquestionably establish the fact

that antibody production is NOT a direct antigen - cell response, but rather that the antigen acts as a specific nerve stimulus initiating reflexes to produce antibodies in the host whose blood stream is completely free from antigen. Research from Metchnikoff, Reitler, et al to A.D. Speransky is repeated and evaluated by Gordienko. Kuntz has an entire section on "Nervous Regulation of Immune Reactions" which he summarizes the good or bad "effects of immunization are utterly dependent upon the functional integrity of the Autonomic nervous system". This places a much different light upon the conflicting reports of the casualties from mass immunization programs.

Fridland (Vie Sovietique, 1947) reported KCN as causing the usual convulsions and death while the same lethal dose of KCN in cats under deep general anesthesia had no ill effect. Next he showed insulin to have no effect on the blood sugar while the usual reflex response was blocked by general anesthesia. Further, the violent anaphylactic shock and death following intramuscular milk injection was not precipitated by the same milk injections when the animal was under general anesthesia. His climax was presented with a drop of Lewesite on the shaved thigh which causes violent irritation and local necrosis. While under general anesthesia the skin was unaffected by the toxic Lewesite. The obvious reason for not widely using deep general anesthesia as a treatment of disease is that the normal reflexes as well as the abnormal reflexes are altered by the anesthesia.

Therefore, we feel that in light of such findings, many previous recoveries in chiropractic offices which have raised doubt in orthodox thinking may well be reconsidered. It becomes quite conceivable that chiropractic is not just a matter of spine straightening nor is it just good for sprains, strains and some headaches.

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Appendix V

Temperature Regulation

R.J. Watkins, D.C. – 1964

The gross patterns of temperature regulation are well known, including the hypothalamic centers as both a sensor and control center. These in turn, regulate the gross mechanisms of shivering, perspiration and others. A part of this mechanism includes a general blood volume into the skin. The heat exchange from the skin by radiation, convection, conduction and the added point of evaporation are generally known. Super-imposed upon this general pattern, is another highly significant segmental pattern previously mentioned.

The segmental control of skin blood volume cannot be mediated through the general sympathetic nervous system, the units of which each cover an area of several spinal segments. Our investigations have shown that instead of being only 26 segments from occiput to sacrum base there are frequently two or more demonstrable zones within each vertebral segment. This necessitates a much more localized intrasegmental mechanism. It has been generally assumed that the sympathetic stimulus causes only vasoconstriction of the terminal arterioles within the skin. However, for over 50 years physiologists have been aware of experiments in which the posterior nerve roots have been cut and subsequent stimulation of the distal segment resulted in vaso-dilation of the skin supplied by that posterior nerve roots ganglion. This has been explained as an anti-dromic reflex involving several branches of a single neuron. Regardless of the final decision of the anatomists, we are consistently demonstrating sharply demarcated zones of vaso-motor control within a single vertemere. One of the reasons for using this mechanism as an indicator in monitoring the central neurophysiology is that it is a constantly functioning mechanism quite accessible to us in the immediate area of the spinal column. This gives us the advantage of being able to do several parallel checks with a minimum of patient movement.

This practical method of monitoring the state of the vasomotor control mechanism is in effect a window into the inner workings of the nervous system. On the basis of our experience to this time, we find this to be the most accurate indicator available of a general functional state of a nerve segment in question. The mechanics are then dependent on a method of measuring not the blood volume, but the blood flow through the skin. We have demonstrated many times that after the skin is slapped or pinched there is an immediate flush of blood into the area to leave a red welt. For a few seconds there is an increased local temperature but the gross dilation leaves a stasis so that the temperature is very quickly dissipated in to the surrounding tissues and does not leave a hot spot one might expect. Therefore, we are able to accurately measure heat transferred either into or away from the skin. In this way we are able to monitor the changes in rate of blood flow. Such monitoring is thus of a central nervous system segmental function of vasomotor control which reflects the state of total functional capability of this segment. This monitoring has been done with matched thermisters after a preliminary cooling of the skin with alcohol in order to offset the

general warming of the skin under the clothing. If the back has been bared to the open air in the resting state for about 15 minutes, this preliminary chilling is often not necessary. The rate of heat flow through and away from the skin is of sufficient segmental demarcation to make significant graphs.

The usual area of major nerve malfunction or interference results in constriction of the blood flow through the skin and a consequent reduction in the heat transfer. This means that contrary to a popular misconception, the area of nerve involvement is a cold strip instead of a hot strip. Relatively minor and acute conditions are frequently unilateral and can be demonstrated with a differential type of heat detector. More significant, chronic areas of involvement are usually bilateral and do not show up at all on a differential type of indicator. This is an additional reason for using two separate sensors and indicators. This consequently involves a much more expensive two channel recording instrument for doing permanent graphs, but the results are more informative by comparison. The ideal graph with a differential unit is a straight line. The ideal with a dual channel unit is parallel lines. The percentage of total complete correction are about 3% so pattern studies have been done for years. Even their objective is striving toward the ideal straight lines.

Perhaps you have realized already that the temperatures which we are recording are skin temperatures based upon the blood flow and cannot in any way be construed to be “nerve heat”. The caloric changes within a nerve trunk have been demonstrated and are so minute as to be measured with great difficulty at the nerve trunk itself and are impossible to measure from the surface of the skin. The perversion of the function of a nerve segment, however, does result in a definite aberration of the local intra-segmental vasomotor control which is quite probably mediated through the process of a single nerve cell (anti-dromic reflex) thus giving us very close demarcation. Also, you may realize that we are not measuring skin temperature per se but are measuring heat transfer through the skin which is a direct function of the blood flow. Fortunately, this is a mechanism which can be measured before and after each individual contact of your chiropractic technique and it has become a very accurate indicator of the total changes in neurophysiology throughout the various stages of single adjustment.

Occasionally we find a marked immediate improvement has been made after each of several successive contacts. In such cases we have continued in one day with as many as 25 or 30 different contacts before the desired improvement was accomplished. This will be demonstrated later with graphs of actual cases but for the moment is mentioned only to show the immediate practical value of this monitoring method as an indicator; as a window for an insight into the inner working of the neurophysiology by monitoring intrasegmental function of the vasomotor control.

Herein we have attempted to show a brief introduction into the anatomy and physiology involved with this segment of total body temperature regulation. More details of this background with more details on related spinal mechanics will be presented as we become more familiar with the various instruments.

Appendix VI

This essay by Watkins elaborates on the segmental neuropathy of kinesiology, as well as some of the clinical applications.

Spinal Kinesiology

R.J. Watkins, D.C.

A combination of cineroentgenography, precise adjusting and monitoring of vasomotor control has revealed the most accurate inter-relationship to date. The fascinating results of neurological monitoring are giving us an indicator much deeper than before into the maze of pathological reflexes described by Speransky. Breaking up the constellation of patterns of dysfunction is obtaining near miraculous results in many so-called irreversible pathologies. This is now answering our questions as to why sudden relapses do occur and why a sudden complete recovery occasionally takes place a month after a series of apparently fruitless adjustments. This breakthrough where we must now take the offensive in delineating the expanded concept of the subluxation is being presented by H.M. Himes, D.C, Dean of the Canadian Chiropractic College. We are inviting further investigation by all the colleges and research groups, then to let the field of science know that we are here and are contributing to neurophysiology and to health.

The most recent cineroentgenological studies are quite revolutionary. In some of Fred Illi's original cervical films we saw a very uneven pattern of flexion and extension in the cervical spine but several new patterns have recently been recorded. One is a case in which the lateral cervical films in extension, flexion and neutral positions are all quite normal. But there is a "jerky" motion through this range. A series of tracings, Fig. A. illustrate how this atlanto-axial flexion was sudden and complete concurrent with an atlanto-occipital extension which was then followed by total atlanto-occipital flexion as the chin was dropped still further. This is a movement which is not easily demonstrated any other way than by cine. A very light adjustment with the finger tip was followed by a marked neurological improvement of symptoms throughout the body and by a much more even, smooth motion of each segment through the total neck flexion. This would then imply a greatly expanded concept of spinal kinesiology, not static position only, but also the "quality" of each movement. The far reaching syndrome of dysfunction can thus be triggered from an area which is almost geometrically perfect while at rest and also at the extremes of motion, but which shows abnormal motion. Aside from the vasomotor monitoring device mentioned, the only other effective office methods currently available are palpation of intrinsic muscle tone and of motion palpation.

The reflex patterns in the nervous system have been approached and normalized to varying degrees by many different Chiropractors with a myriad of different types of adjustments. Our compilation of data resulting from many of these recent studies has given us a new perspective for evaluation and judgment of the efficacy of all the past techniques as well as a fascinating new one

which can best be labeled "AURICULAR PROPRIOCEPTIVE TECHNIQUE." Another article details this.

One subject who claimed to be perfectly normal and symptom free showed drastic neurological involvement of the entire low thoracic and lumbar region. He later admitted to periodic excruciating low back ache of a sciatic type. A cine film strip revealed an atlanto-occipital hyperextension subluxation with the posterior arch of atlas very tight against the base of occiput due to posterior atlanto-occipital muscular spasms. Fig. B.

This was adjusted effectively by moving the atlas from the posterior bilaterally and immediately palpated in a much better position. Vasomotor control monitoring showed no improvement in the neurophysiology. The patient was placed supine and palpated again showing almost complete recurrence of the subluxation within these few minutes. The helix of the ear was grasped firmly and lightly to initiate proprioceptive sensations affecting the cervical righting reflexes. There was almost complete and sudden relief of the subluxation. The intrinsic muscle hypertonicity cleared within one minute and the patient was left to rest for a few minutes further. Dramatic neurological improvement was monitored and a subsequent cine strip showed very normal atlanto-occipital flexion. After this the patient was questioned further and admitted that he had a stiff neck for over two years since an automobile accident which was now, following the adjustment, the best it had been for all those years. A re-check three weeks later showed a minor build-up of tension after a prolonged study session two nights previously.

We have heard from various sources that there is very little motion within the thoracic spine because it is severely limited by the rib cage. One set of films done very recently, has revealed 24 1/2 degrees of flexion from the neutral position between T8 and 12. One may well wonder where the sternum goes during this excursion but this can be readily demonstrated. Lateral bending between T8 and 12 in this same patient revealed 32 degrees of angulation. Remember that this is the total physiological range of the entire thoracic cage as a unit, which may well show considerably less motion between individual vertebrae than will an acute local subluxation where the one articulation is distorted to a maximum and not limited by similar motion of the adjacent vertebrae. This subluxation often shows 10 degrees of tilt and even more rotation. One of the frustrating situations in evaluating such a spinal distortion is the case of the unattended subluxation which has partially reduced through rest without benefit of chiropractic care. Intrinsic muscular, ligamentous and neurological adaptation at times leaves this articulation eventually almost symptom free. As demonstrated in the Waldo E. Pohner Honorary Lecture on "Normal and Abnormal Pelvic Kinesiology" at NCCB Symposium in Denver, Colorado, April 1963, the patient may have had a trauma which subluxated the vertebrae into a symptom source while being geometrically perfect in alignment with its neighbor. This again is where careful palpation of the intrinsic musculature and of joint motion is a great help. The vasomotor monitoring system previously mentioned frequently indicates that this gross subluxation is not the best place to start adjusting and that its maintenance and correction may in turn both be triggered from a distant area.

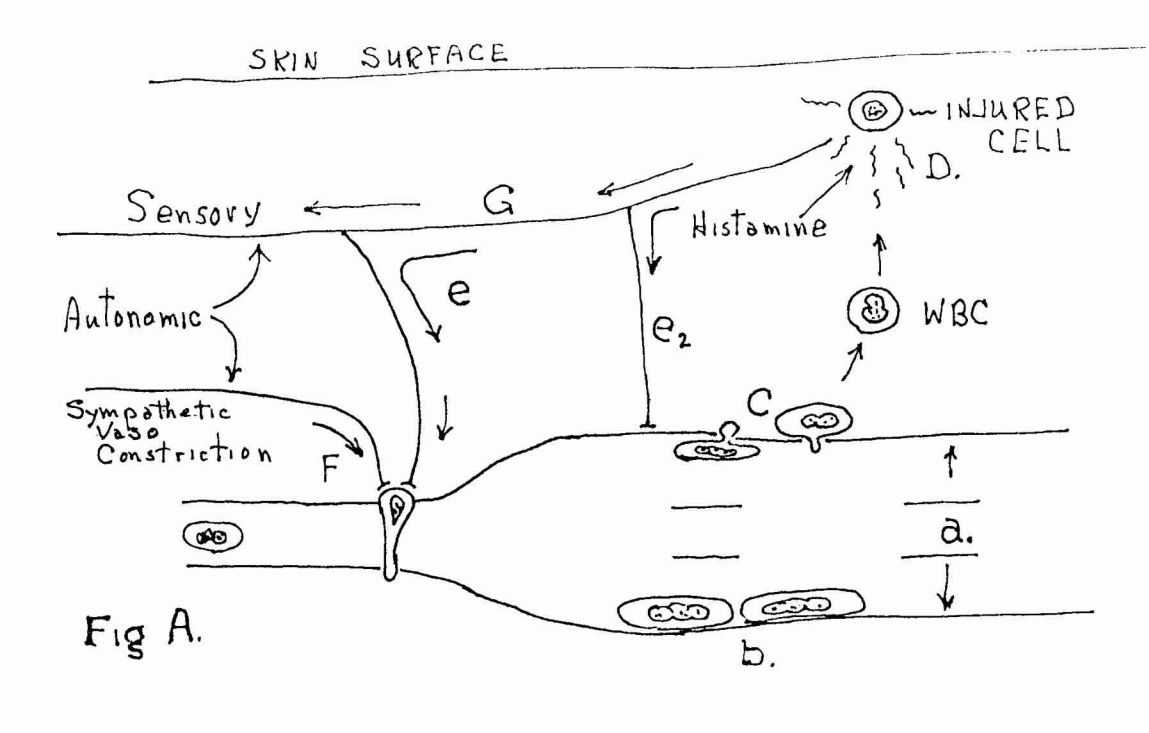
From this very brief paper it can be clearly seen that we must either adopt another terminology or expand the connotation of the term "Chiropractic Subluxation" to include not only the geometric positions of the two adjacent vertebrae, but also the aberration of the normal conversational tone of sensory stimuli into that neural segment and the total syndrome of effects on peripheral organs and distant segments. Fortunately, with the present degree of co-operation between the Colleges as a source of real research we can anticipate a great unfoldment of the Chiropractic concept.

Appendix VII

Vasodilation Neurology

R.J. Watkins, D.C., and Eric Shrubb, D.C.

Cohnheim in 1887,1 and Metchinikoff in 1892, 2 described the "Vascular Phenomena" after observing the very thin membrane of a frog mesentery under a microscope. Lightly heating the tissue with a hot light beam induced a vasoconstriction for a moment, then vasodilation (Fig. A-a), then peripheral drift of leukocytes (b) and diapedesis (c) with the white cells slipping out of the vessels by putting a "foot" through the "crack" and then crawling through that foot These phagocytes then cleaned up the debris. It was thought for years that there was a direct chemical stimulus to the wall of vessels by the histamine to cause the vasodilation. The "trail" of the histamine was thought to be the basis of "chemotaxis" with the phagocytes going directly to the "bait" put out by the injured cells (d). This has been repeated many times, but one factor was overlooked. The same experiment can be done with all the nerve supply previously cut. In this case with the same tissue heating and the same histamine release by injured cells there is NO inflammatory response. There is no dilation, no diapedesis and no phagocytosis. The tissue just rots away and then is sloughed and cleaned out by the adjacent peripheral tissue which still has intact nerves. This would indicate that there is a neurological link not previously described. Hence, we should investigate the nerve link in the histamine reaction. Speransky cited numerous experiments to demonstrate that even coal tar irritation, which commonly caused cancer, had a similar "no-effect" when the nerve was cut to the irritated tissue. 4



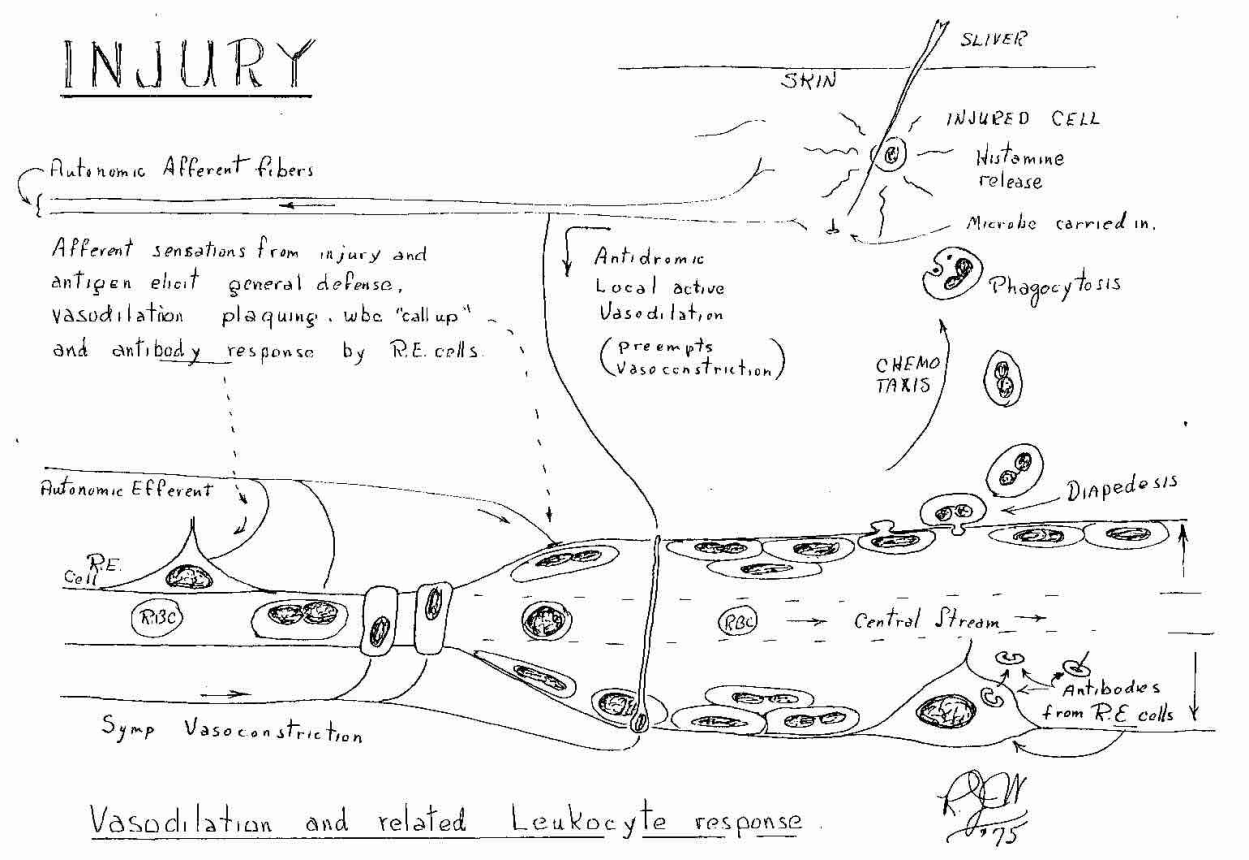
In 1876, Strieker noted that stimulation of a sectioned posterior root (k) induced peripheral vasodilation.5 Since it was considered that the neuron can propagate an impulse in only one direction (g) (Bell-Magendie Law), it was thought that there were vasodilator cells in the lateral horns (1) with their axons making exit through the posterior horn instead of the usual anterior horn. They were thus called antidromic neurons. However, after adequate time for degeneration of the axons after sectioning, the same peripheral vasodilation occurred. That would indicate that there might be a few cell bodies in the dorsal root ganglion with an antidromic vasodilation function. Verner had illustrations of these concepts in *Science and Logic of Chiropractic* 6. After nicotine was injected into the dorsal root ganglion to totally block any synapses, the stimulation of the sectioned posterior root still caused the local vasodilation as did peripheral stimulation of these dorsal nerve root ganglion cells.7 (m)

With that background reference material it is now possible to understand more of a common phenomenon. Lightly press or 'scratch" a thin line across the palm with a fingernail. Within one second, the line becomes pale with a momentary vasoconstriction. This is a local defense mechanism to isolate that injured area and stop further injury spread. In about five seconds the line becomes red instead of white. Here is the extremely localized vasodilation which was for years attributed solely to histamine release, direct chemical block of the sympathetic vasoconstriction and the consequent vasodilation. Remember that with the nerve cut the inflammatory reaction does not occur, so there is a nerve reflex involved. Notice the logic involved next in this story. Stimulation of a sympathetic ganglion causes peripheral somatic vasoconstriction. (I)

Blocking one ganglion had little effect because the vasoconstrictor function is overlapped on 4 or 5 segments. Cutting away several adjacent sympathetic ganglia induces an immediate vasodilation. This is passive vasodilation. The extremely localized red line related to the scratch on the skin is NOT passive nor does it cover several vertebral segment distribution areas. Hence, this red line has been called a LOCAL ACTIVE VASODILATION. 9 As far back as 1901 Bayliss had used the term *antidromic dilation* (h) for the peripheral vasodilation induced by posterior root stimulus.10 Now we can consider Dale's Law:

> *"If a neuron releases a given substance at one branch of its axon which has a function as a synaptic transmitter, then the same substance will be released at the synapse formed by all other branches of the axon." 11*

Dale's hypothesis assumes a special significance in the case of the primary sensory neurons which are bipolar (embryologically) in nature with one branch peripherally directed and the other forming central connections in the cord and medulla. In adults these DNRG cells appear to be unipolar with the efferent and afferent processes adjoining like a "mixed" trunk. These dorsal root ganglion cells often have many collateral branches. In light of the preceding material it becomes more apparent why Fig. A can be very accurate in the typical histamine response to heat injury. Barron and Matthews report that *"Some 40% of the posterior nerve root fibers can carry centrifugal impulses."* 12 This would indicate a very broad coverage by local active vasodilation. The damage illustrated in Fig. A causes a classic inflammatory reaction and repair when the autonomic nerve is intact. When the nerve is cut there is no vasodilation and repair but only death of that tissue. Hence, it becomes more apparent why and how some wounds have been slow to heal but have made dramatic recovery following spinal adjustments. Instead of cut nerves we have impaired nerve function at the subluxation level. This helps to explain why even dental surgery and abdominal surgery will heal so much more quickly if adjustments are made right after the surgery (which often induces reflex subluxations and aggravates existing ones.)



Someone will likely ask what an adjustment has to do with this perverted physiology. How can a subluxation delay the healing as is often demonstrated by clinical results? Some of the results from 5 minute thumb pressure on an Atlas transverse process reported by Bums in 1910, included visible vasodilation of the conjunctive tissue as well as delayed reaction time.13 More recent experiments with electromyography reveal altered chronaxia and slower reflex time where a subluxation is present. Petersen reported using a thermister balometer (a radiometer) and checked skin temperature over a nerve pathway peripheral to a subluxation.14 With postural reflexes and no physical contact on the body within several inches of the subluxation, there were very visible metered thermal changes as the subluxation changed. As the subluxation was improved the segment warmed. When the subluxation was reflexly aggravated the segment cooled and was again warmed within seconds as the subluxation was again improved. Many of the students using the palm of the hand as a radiometer, have been able to detect warming of cool spots in less than one second after moving the vertebral joint, reducing the subluxation with distant postural reflex pressure, and using no direct contact on the body within many inches of the subluxation.15 These thermal changes plus the intrinsic muscle balance of rotators, intertransversari, etc. plus tender "trigger points" and leg checks all improve or become worse immediately and concurrently as the subluxation is improved or aggravated.

Fig. B will illustrate the collateral branches (e) of the cutaneous sensory neurons and their organic, anatomical bases for the phenomena, whereby many chiropractors use skin temperature

devices to evaluate subluxation pathogenicity and response to adjustments. The same nerve pathways are utilized in another vasomotor response technique where two strokes are made parallel to the spinous processes about two inches lateral of the midline. Normally, this will be pale for a couple seconds and then becomes evenly red. The levels with delayed reddening are likely areas of subluxations. The response normalizes quickly with an adequate adjustment. The contact and thrust may be at this "indicator" subluxation, or at a distant but related subluxation.

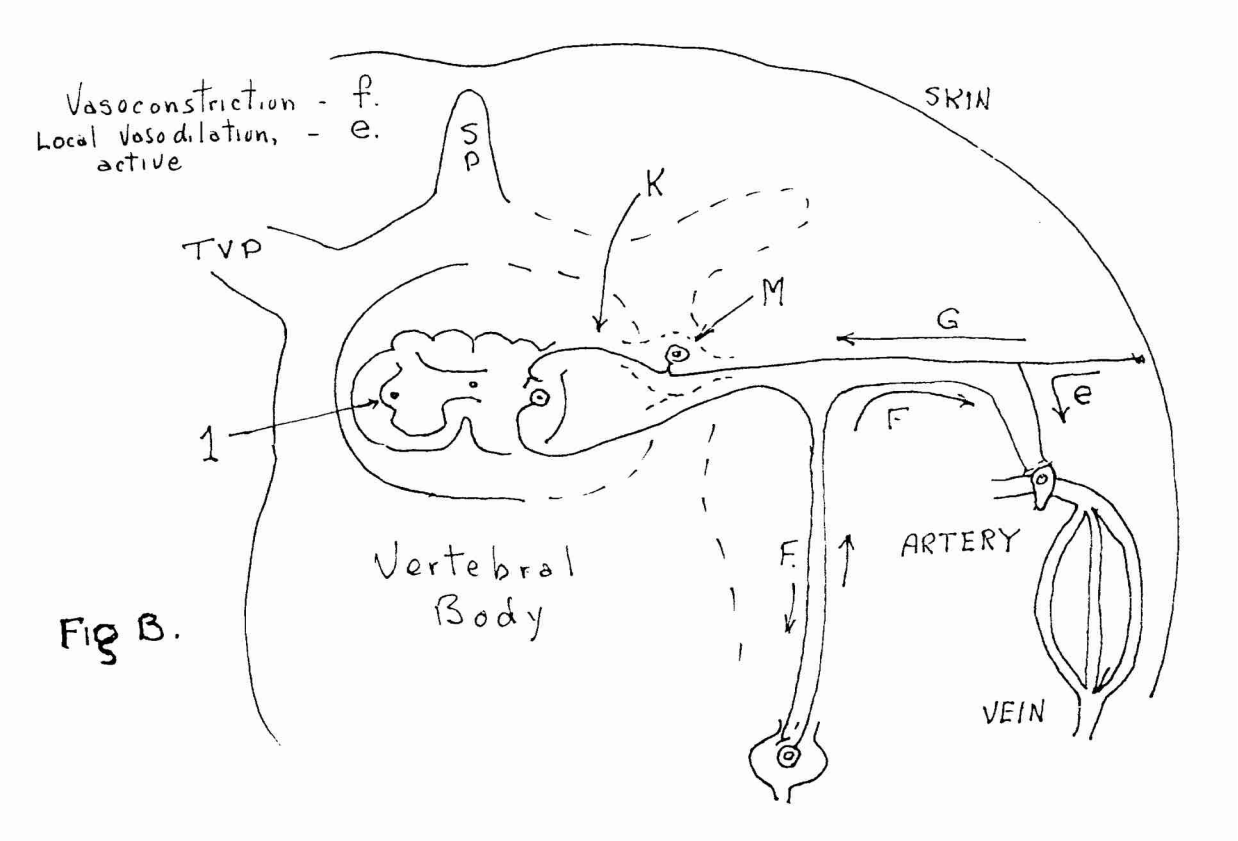


Fig B.

Notice how the collateral axons to the arterioles are the pathway for local active vasodilation, when this antidromic reflex spreads from thermal receptors in one case, from pain receptors in another and from histamine stimulus in yet another (e). As this neurophysiology is appreciated it becomes increasingly apparent that the trophic antidromic function explains not only many of the delayed healing responses which are normalized when the subluxations are corrected, but also explains the various instrumentation procedures used over the years. Another paper on skin temperature considers more detail on these procedures and interpretations.16

Simultaneously, with somatic vasomotor changes are similar visceral changes of vasodilation and vasoconstriction. Due to "two-way shunts" of small collaterals and intemuncial crossovers, like access ramps on crossing freeways, there is a constant viscerosomatic intercommunication of both normal and abnormal states.

Now in summary:

Antidromic vasodilation had been known since 1897.

This *local active* vasodilation is not a block of vasoconstriction only.

The pathway used is a collateral branch of a DNRG sensory neuron.

One such single isolated pathway can be a very minute, almost microscopic area(e).

Many such DNRG cell collateral branches will be included in part of a vertemere.

This can explain the extremely segmentalized cool strips at a subluxation and why there are two or three such strips within one subluxated vertemere.

This can also explain the neurology of localized injury vasodilation and the localized neurology of immune responses.

It also explains the localized delayed healing of wounds and fractures. This resting vasodilation is a continual function superimposed upon the recurrent active sympathetic somatic vasoconstriction (and/or vasodilation). An early effect of a subluxation is damage to and loss of this normal physiology of local active vasodilation which explains much instrumentation use. Even though this mechanism has been well investigated it is usually overlooked by neurophysiologists, because it has such a small effect on total body temperature. Since it is such a vital link in many commonly observed clinical responses, it is very helpful for chiropractors to understand this mechanism. What easier way to understand and to explain to a scientist the basis of chiropractic success with delayed healing, with cold strips, with immunity and with the validity of skin temperature evaluation. This vasodilation neurology represents a valid scientific foundation underlying the explanation for much of the chiropractic success with many clinical problems.

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Appendix VIII

These brief excerpts from the little-known work of Ishikawa shed light on the sub-title of the Segmental Neuropathy text: "The First Evidence of Developing Pathology."

Viscero-Cutaneo-Vascular Reflex and its Clinical Significance

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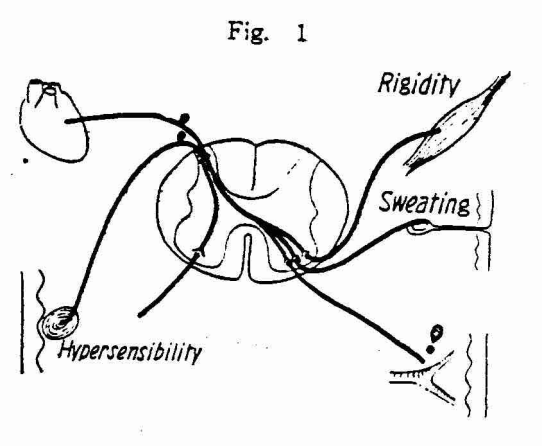
Kanazawa University Vol. XVIII, No.1, 1960

When an abnormal stimulus from a visceral disease is carried to the posterior root of the spinal cord, a so-called MacKenzie's irritable focus is established in this area. Accordingly, a variety of reflex responses appear in those respective dermatomes. They are as follows: a) sensory abnormalities, e.g. hyperesthesia, or tenderness, b) motor abnormalities, e.g. muscular spasm or rigidity, c) secretory abnormalities, e.g. abnormal sweating, b) metabolic abnormalities, e.g. parietal atrophy in chronic diseases (Fig. 1).

Fig. 1



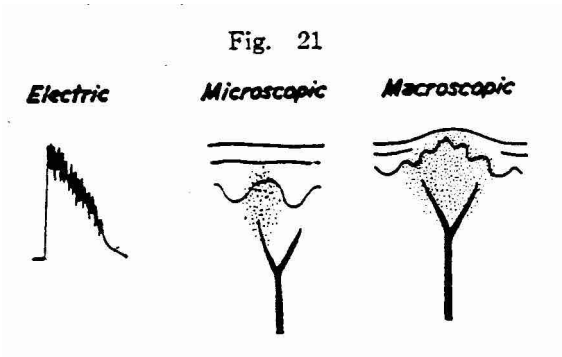
These reflex responses are perplexing and complicated, but have been studied in detail as a referred reflex.

In addition, we would like to add to this category the newly discovered cutaneous vasomotor reflex (cutaneovascular reflex). When a visceral stimulus is projected to the subcutaneous arteriole in the corresponding dermatome, some neural vasomotor disturbances are to be resulted. As the subcutaneous arteriole represents the typical end-artery, the insufficient circulation of the blood causes the exudative changes due to the impaired permeability of the

capillaries and the bionecrotic changes due to the defective nutrition in the delta-form area nourished by the involved artery.

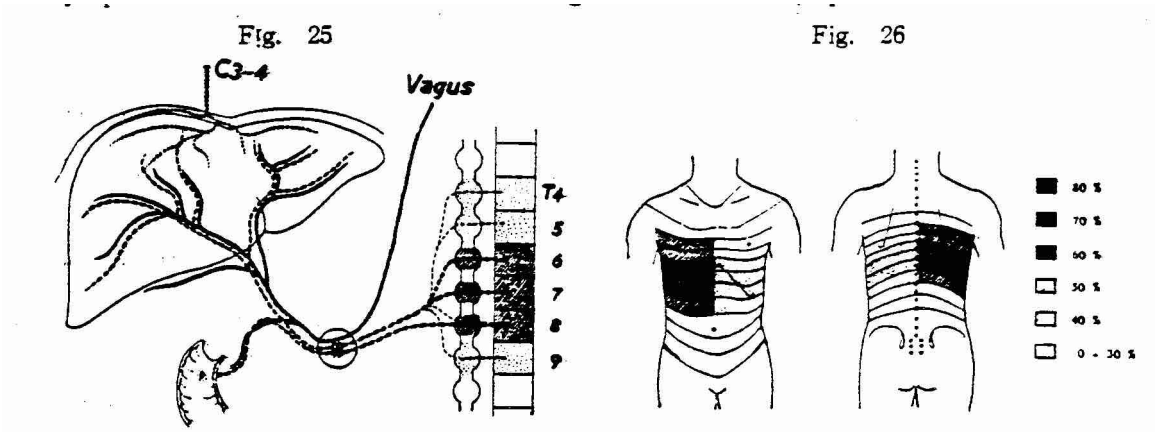
…These cutaneous reflex points have not been noticed by anyone for the following two reasons: firstly, there have been no adequate measuring machine devised; secondly, the cutaneous reflex points are only 0.5mm in diameter and have been neglected.

…As already described, the cutaneous reflex points are due to the neural disturbance of the blood circulation in the subcutaneous arterioles, some of which are visible papules, but most of which are only microscopically recognizable exudative changes. It is proved by the microscopic examination of the reflex points in the excised skin. It is traced as one of the exudative processes by summarizing the findings of the cutaneous reflex points. This figure (Fig. 21) presents the variations.



…Before the microscopic changes appear, however, the cutaneous reflex points manifest the changes in the electrophysiological nature through the exudative mechanism. Our electrodermatograph is able to disclose these changes and the cutaneous reflex points before the microscopic examination.

…The correlation between the sympathetic sensation and the corresponding dermatomes will be described in the liver and heart.



First, the hepato-parietal reflex will be depicted. As the so-called sympathetic sensation of the liver belongs to Th 3-10 (esp. Th. 6-8), the reflex is to be projected to the paries corresponding to the same. (Fig. 25) The determination of the dermatomes in the cutaneovascular reflex resulted in Fig. 26, summarizing the distribution of the frequencies. This figure is identical with the Head's hyperalgesic zones in the liver diseases (including the billiary duct) in Fig. 27; While the Head's zone represents a belt-like area, our reflex takes a form of point. The reflex points are anatomically concentrated in a certain area even within a dermatome.

Fig. 27

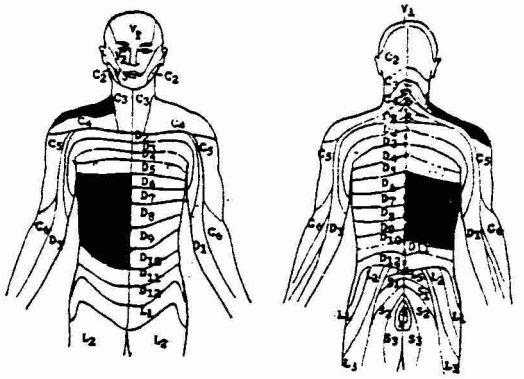
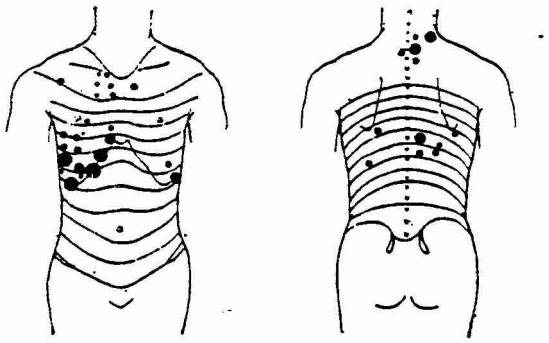
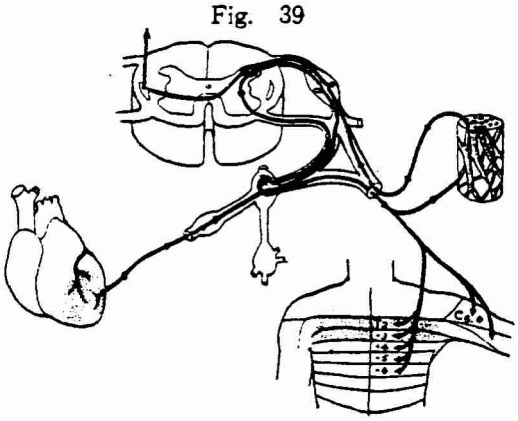


Fig. 28



…The *cardio-parietal* reflex will be explained in brief here. As the so-called sympathetic sensation of the heart belongs to C 7 to Th 7 (esp. Th 1-5) (Fig. 39), the reflex points are established in these respective dermatomes.

Fig. 39



…Therefore, it may be concluded that heart disease can be detected with higher incidence and at the earlier stage by the use of electrodermatography rather than by electrocardiography.

The liver diseases are detected more readily by electrodermatography compared with other liver function tests.

…While the visceral disease is projected to the skin as a viscero-cutaneous reflex, the stimulus on the skin is projected into the organ as a cutaneo-visceral reflex. The former gives a base for the diagnosis, and the latter for the therapy. In relationship of the reflexes between the organ and the skin, our cutaneous reflex points are diagnostic and at the same time therapeutic.

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